RADIO REPORT

FCC 47 CFR Part 15C
ISED Canada RSS-247

Frequency hopping systems operating within the 2400.0 MHz - 2483.5 MHz MHz band

Report Reference No	G0M-2111-1168-TFC247BT-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	DAkkS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	HBC-radiomatic GmbH
Address	Haller Str. 45-53 74564 Crailsheim GERMANY
Test Specification	47 CFR Part 15C RSS-247, Issue 2, 2017-02 RSS-Gen, Issue 5, Amendment 2, 2021-02
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Radio module for industrial application
Model(s)	TC242
Additional Model(s)	None
Brand Name(s)	None
Hardware Version(s)	TC242C01
Software Version(s)	SC027000 (antenna sample) SC027100 (MMCX connector)
FCC ID	NO9TC242
IC	2977A-TC242
Test Result	**PASSED**

Not required by standard	N/R	
Not applicable to EUT	N/A	
Test object does meet the requirement	P(PASS)	
Test object does not meet the requirement	F(FAIL)	
Testing:		
Test Lab Temperature	20 °C - 30 °C	
Test Lab Humidity	25 % - 55 %	
Date of receipt of test item	2022-03-25	
Report:		
Compiled by	Wilfried Treffke	
Tested by (+ signature) (Responsible for Test)	Wilfried Treffke	W. Treff
Approved by (+ signature) (Deputy Head of Lab)	Toralf Jahn	T. J
Date of Issue	2022-06-07	
Total number of pages	154	
General Remarks:		
The test results presented in this report relate only to the object tested. **The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.** This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		

ADDITIONAL VARIANTS

Additional Variants (partially tested)		
Variant	**Description**	
1	Product Type Description	Radio module for industrial application
	Model name	TC242
	Brand name	None
	Hardware Version	TC242C04
	Software Version	SC027100 (MMCX connector)
Comment: The additional variants mentioned above were partially tested. Partial test cases: - Occupied bandwidth, - 20 dB bandwidth, - Maximum peak conducted output power, - Conducted spurious emissions - Band-edge compliance Those additional variants of the series have been declared by the manufacturer		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2022-06-07	Initial Release	

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
BR	Basic Rate (Bluetooth)
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V_{NOM}	Nominal supply voltage

REPORT INDEX

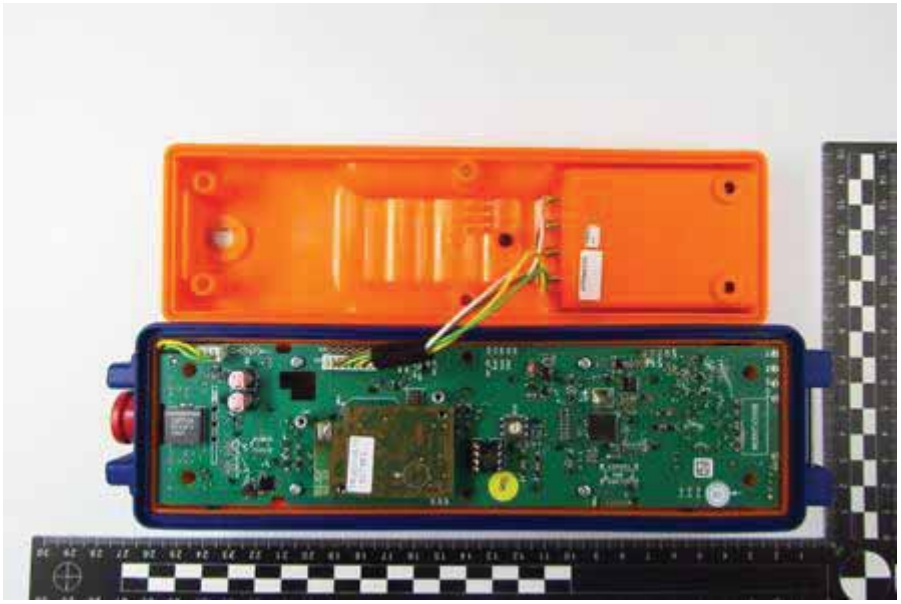
1 Equipment (Test Item) Under Test

Description	Radio module for industrial application	
Model	TC242	
Additional Model(s)	None	
Brand Name(s)	None	
Serial Number(s)	Prototype Radiated Test Sample ID 39316 (#5.2) Prototype Conducted Test Sample ID 39318 (#7.2) Prototype Conducted Test Sample ID 39314 (#3.2) partial test	
Hardware Version(s)	TC242C01	
Software Version(s)	SC027000 (antenna sample) SC027100 (MMCX connector)	
PMN	TC242	
HVIN	TC242	
FVIN	N/A	
HMN	N/A	
FCC ID	NO9TC242	
IC	2977A-TC242	
Equipment type	Radio Module	
Radio type	Transceiver	
Assigned frequency bands	2400.0 MHz - 2483.5 MHz	
Radio technology	Proprietary hopping system	
Modulation	GFSK	
Number of antenna ports	1	
Antenna 1	Type	Intergrated antenna
	Model	OnBoard Inverted-F
	Manufacturer	HBC-radiomatic GmbH
	Gain	0 dBi (declared by customer)
Antenna 2	Type	External antenna
	Model	AA050031 (Dipole antenna)
	Manufacturer	HBC-radiomatic GmbH
	Gain	3.3 dBi (declared by customer)
Antenna 3	Type	External antenna
	Model	AA030018 (Sleeve antenna)
	Manufacturer	HBC-radiomatic GmbH
	Gain	1.8 dBi (declared by customer)
Antenna 4	Type	External antenna
	Model	AA080004 (Monopole 35mm)
	Manufacturer	HBC-radiomatic GmbH
	Gain	1.7 dBi (declared by customer)
Supply Voltage	V_{NOM}	3.7 VDC
Operating Temperature	T_{NOM}	20 °C
Manufacturer	HBC-radiomatic GmbH Haller Str. 45-53 74564 Crailsheim GERMANY	

1.1 Photos – Equipment External

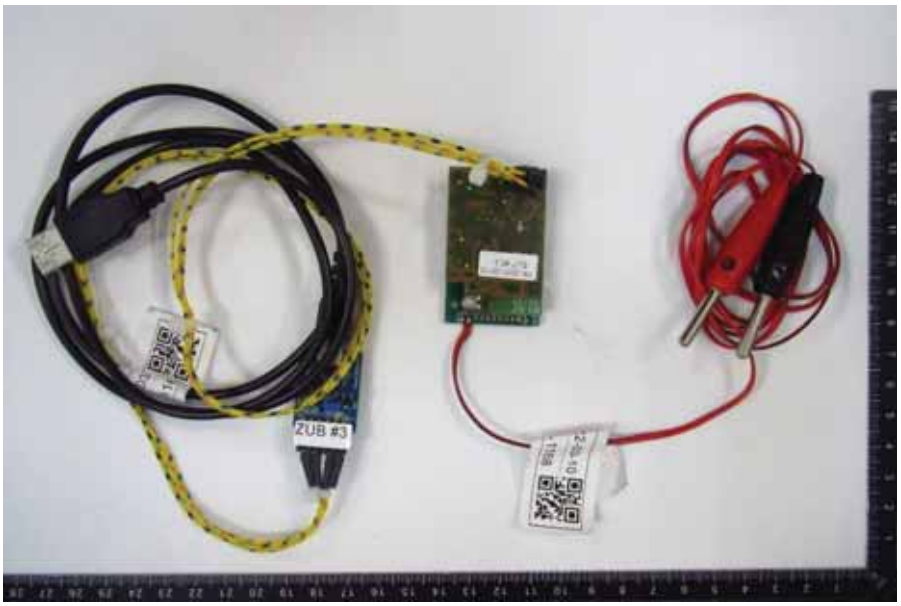
Host Top View


Host Bottom View

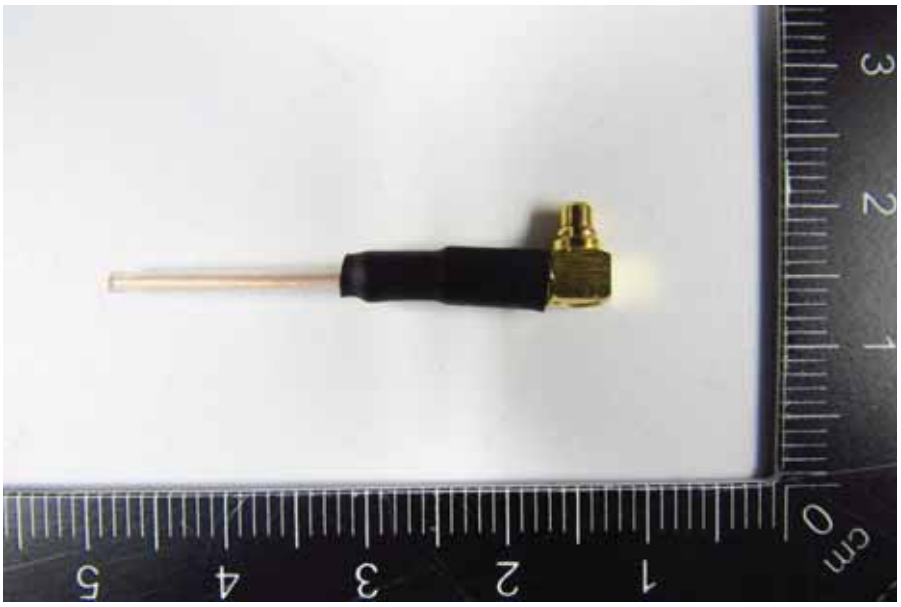

Host with Module


Host Right View


Host Left View


Overview EUT Conducted With Programming Interface


AA050031 (Dipole antenna)


AA080004 (Monopole 35mm)


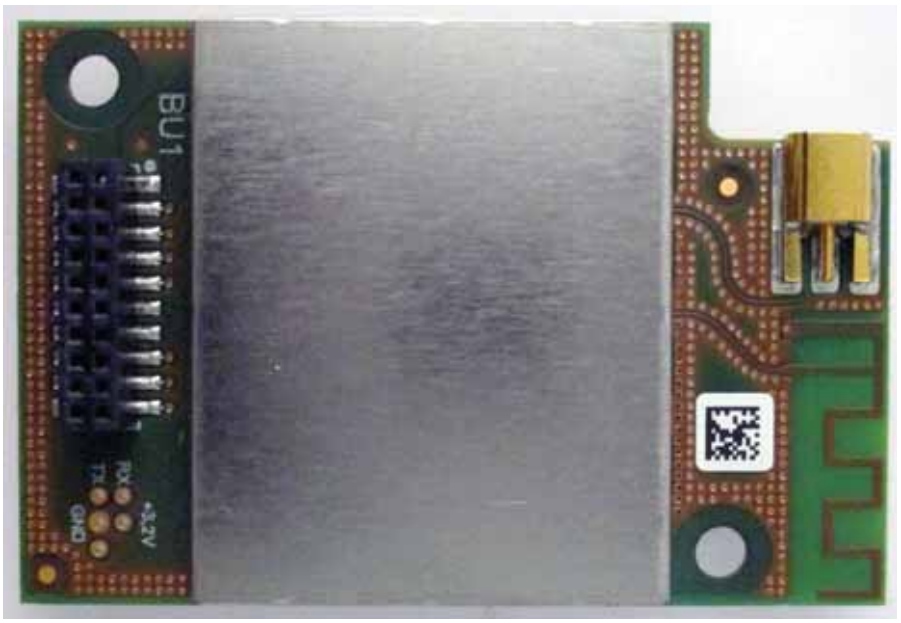
AA030018 (Sleeve antenna) with MMCX to SMA Adapter

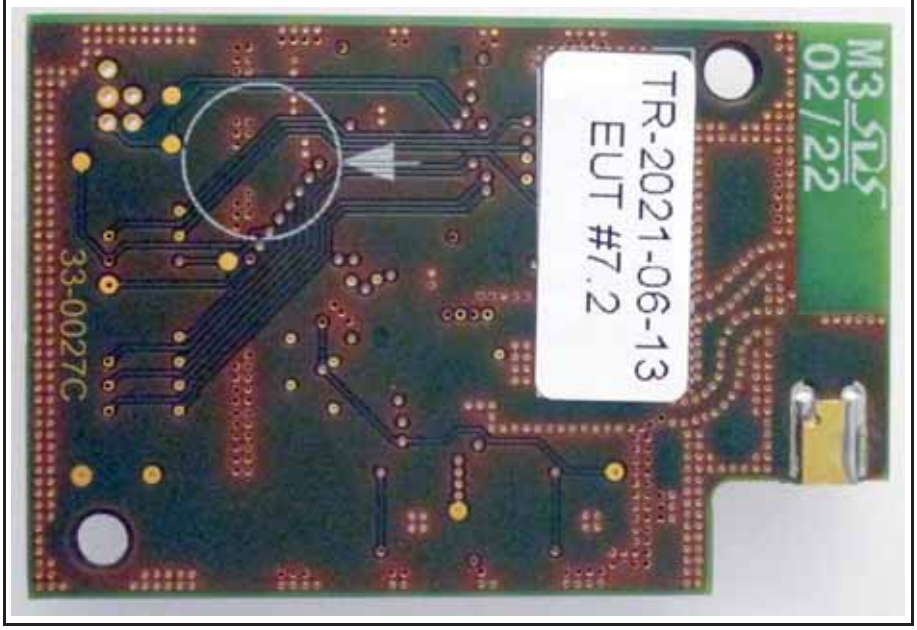
AE: Companion Device Top View

AE: Companion Device Bottom View

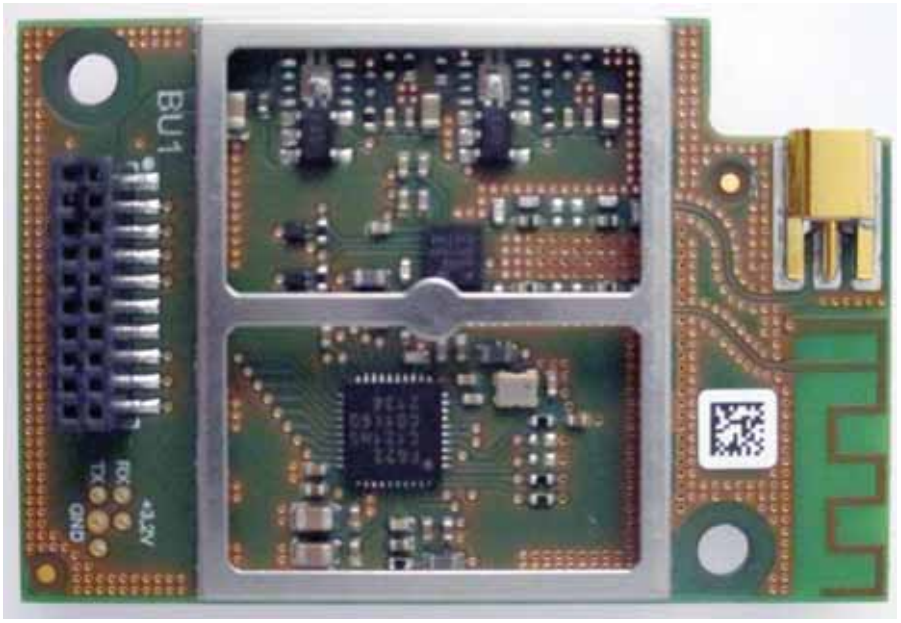
AE: Companion Device, Open Housing View

1.2 Photos – Equipment Internal

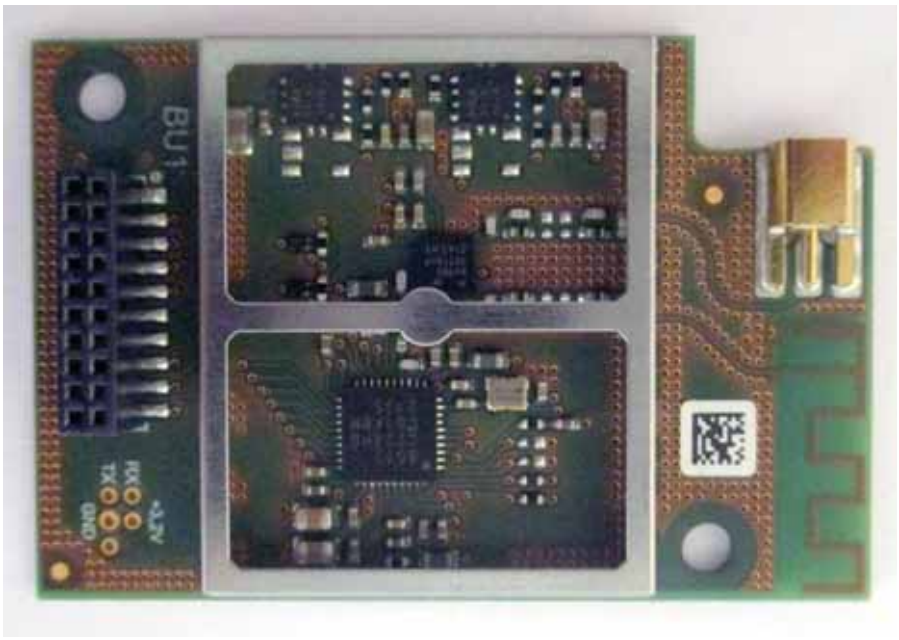
TC242C01_EUT7.2 – conducted sample top view


TC242C01_EUT7.2 – conducted sample – bottom view


TC242C01_EUT7.2 – conducted sample without shielding


TC242C01_EUT5.2 - radiated sample without shielding


TC242C04_EUT3.2 - conducted sample without shielding
Additional Variant



1.3 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE1	Laptop	Lenovo	T450	To set EUT in test mode
AE2	USB-UART converter	39318	39318	39318
AE3	Laboratory power supply	Statron	2224.7	The EUT needs an external power supply to perform.
CBL	Auxillary cable	-	-	To connect EUT and power supply.
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.4 Operational duty cycle

1.4.1 Information

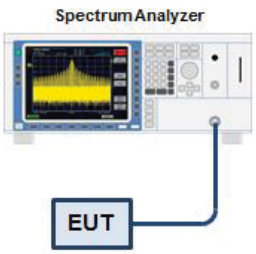
Test Information	
Measurement Method	ANSI C63.10 11.6

1.4.2 Requirements

Requirements	
Duty cycle	Duty cycle correction
≥ 98 %	No correction required
< 98 %	Correction required (10 x Log_{10}(1/DC)

1.4.3 Setup

Test Setup



1.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW 43	EF00896	2021-07	2022-07

1.4.5 Procedure

Test Procedure

1. EUT set to test mode
2. Span is set to zero span
3. Detector set to peak
4. Sweep time is set 100ms
5. Envelope peak value of emission spectrum is selected.
6. Record one complete pulse train including blank intervals.
7. The maximum burst duration T_{ON} is measured using two markers set to the start and the end of the longest burst
8. The minimum idle duration T_{OFF} is measured using two markers set to the start and the end of the shortest idle period
9. The duty cycle is calculated by DC = T_{ON} / (100ms)
10. The duty cycle correction is calculated by DC = 10 x Log_{10}(T_{ON} / 100)

1.4.6 Results

Duty Cycle Results according to FCC Part 15 Section 15.35(c)		
Mode	Duty Cycle [@ 100ms]	Correction Factor [dB]
GFSK, Hopping 2	0.1	-10
Comments:	In normal operation based on the functionality of the host system a duty cycle of only 10 % is possible. Only in defined test modes which can be activated via service interface only a duty cycle of more than 10 % is possible. These test modes can not be activated by a host system. Maximum allowed duty cycle correction acc. to ANSI C63.10: -20 dB	

1.5 Test Modes

Mode	Description
GFSK Single	Mode = Transmit Modulation = GFSK Spreading = None Duty cycle = 100%
GFSK Hopping 1	Mode = Transmit Modulation = GFSK Spreading = None Hopping on a single channel Duty cycle = 10%
GFSK Hopping 2	Mode = Transmit Modulation = GFSK Spreading = FHSS Hopping on all channels Duty cycle = 10%
Receive	Mode = Receive (Scan)
Comment:	

1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	1	2401.00
F2	Tx / Rx	80	2438.92
F3	Tx / Rx	160	2477.32

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBµV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

Reading on Analyzer (dBµV) + A.F. (dB/m) = Net field strength (dBµV/m)

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

Limit (dBµV/m) = 20*log (µV/m)

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dBµV + 26 dB/m	= 47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15C, ISED RSS-247				
Product Standard Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
ISED RSS-Gen, Issue 5 A2 (section 6.7)	Occupied Bandwidth	ANSI C63.10-2013	N/R	Informational only
FCC § 15.247(a)(1) ISED RSS-247 § 5.1 Issue 2	20 dB Bandwidth	ANSI C63.10-2013	PASS	
FCC § 15.247(a)(1)(iii) ISED RSS-247, Issue 2 (section 5.1)	Number of hopping frequencies	ANSI C63.10-2013	PASS	
FCC § 15.247(a)(1) ISED RSS-247, Issue 2 (section 5.1)	Frequency hopping channel separation	ANSI C63.10-2013	PASS	
FCC § 15.247(a)(1)(iii) ISED RSS-247, Issue 2 (section 5.1)	Time of occupancy (Dwell time)	ANSI C63.10-2013	PASS	
FCC § 15.247(b) ISED RSS-247, Issue 2 (section 5.4)	Maximum peak conducted power	ANSI C63.10-2013	PASS	
FCC § 15.207 ISED RSS-247, Issue 2 (section 3.1)	AC power line conducted emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Band edge compliance	ANSI C63.10-2013	PASS	
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Conducted spurious emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) FCC § 15.209 ISED RSS-Gen, Issue 5 A2 (section 6.13)	Transmitter radiated spurious emissions	ANSI C63.10-2013	PASS	
ISED RSS-247, Issue 2 (section 3.1)	Receiver radiated spurious emissions	ANSI C63.4-2014	PASS	
Comment:				

Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

3 Test Conditions and Results

3.1 Test Conditions and Results - Occupied bandwidth

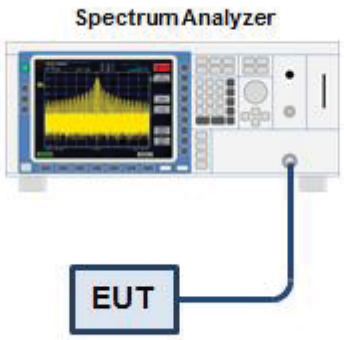
3.1.1 Information

Test Information	
Reference	ISED RSS-Gen, Issue 5 A2 (section 6.7)
Measurement Method	ANSI C63.10 6.9.3
Measurement Uncertainty	± 1.26 %
Test Sample ID	39318
Operator	Wilfried Treffke
Date	2022-04-12

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup

Test Setup


3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	CAABI	EF00779	2022-02	2023-02

3.1.5 Procedure

Test Procedure
1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set to the range of 1 % to 5 % of the occupied bandwidth 4. The occupied bandwidth is measured with the build-in analyzer function

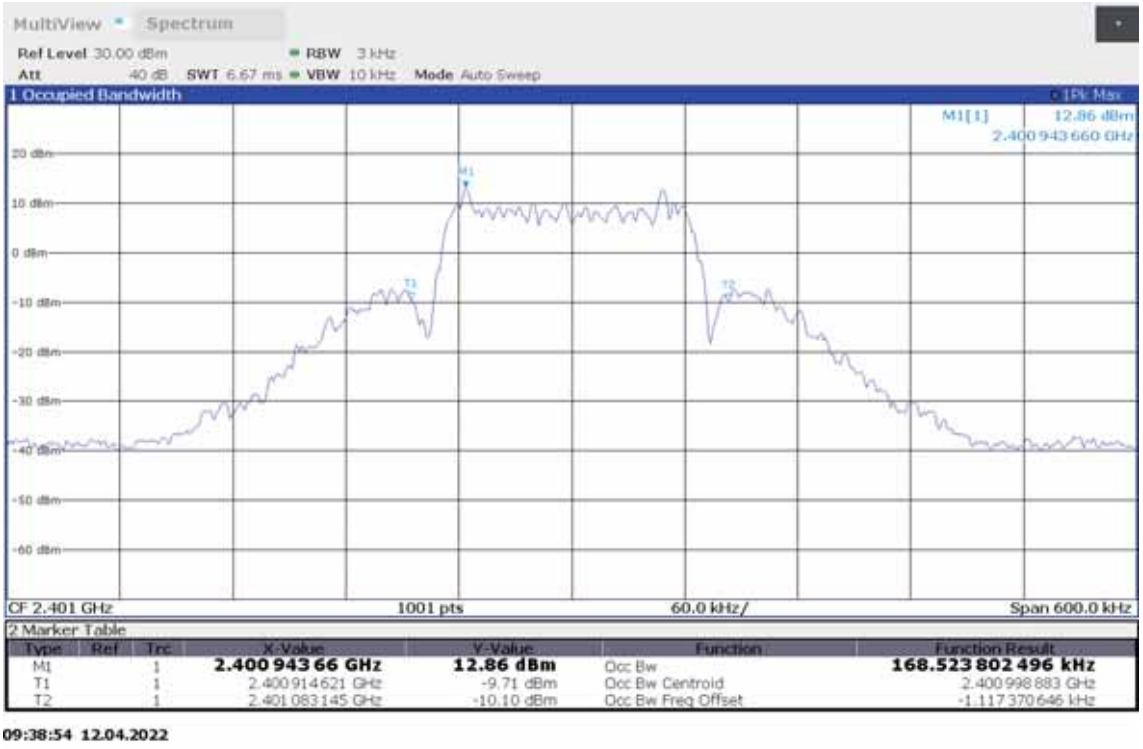
3.1.6 Results

Test Results – EUT 7.2 (ID 39318)		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK, Single	2401.00	0.168
GFSK, Single	2438.92	0.167
GFSK, Single	2477.32	0.167

Test Results – EUT 3.2 (ID 39314)		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK, Single	2401.00	0.165
GFSK, Single	2438.92	0.165
GFSK, Single	2477.32	0.166

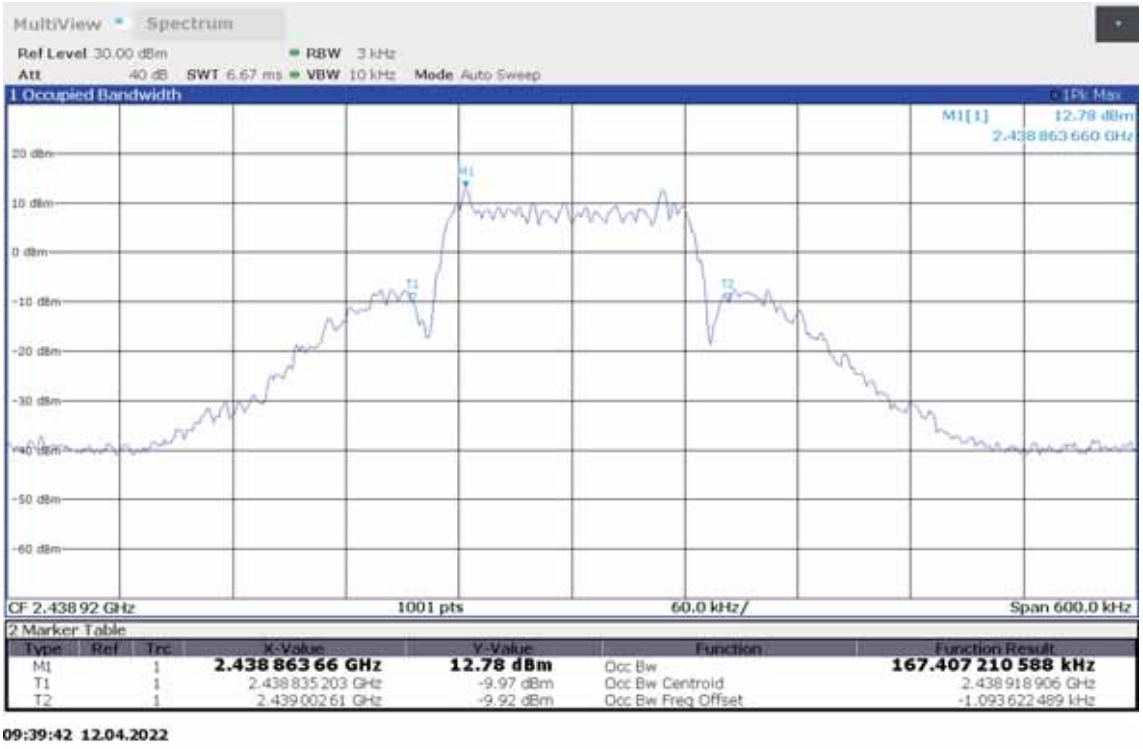
Occupied Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 1, 2401 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Occupied Bandwidth [MHz]:	0.168



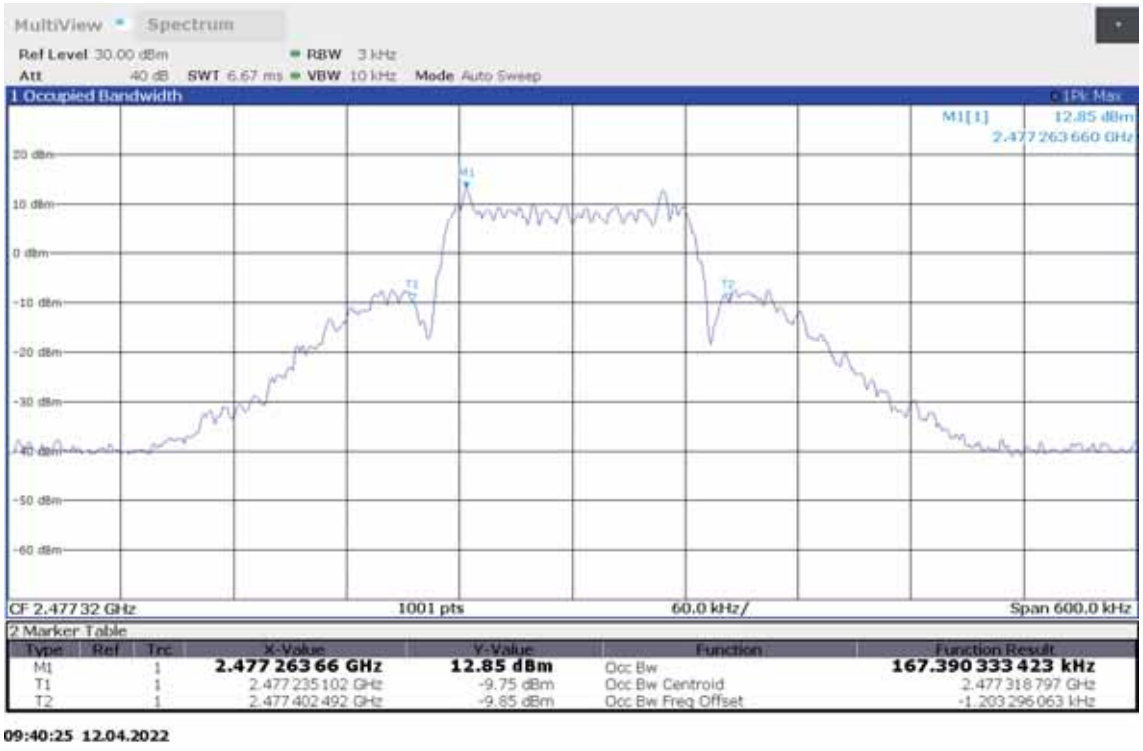
Occupied Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 80, 2438.92 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Occupied Bandwidth [MHz]:	0.167



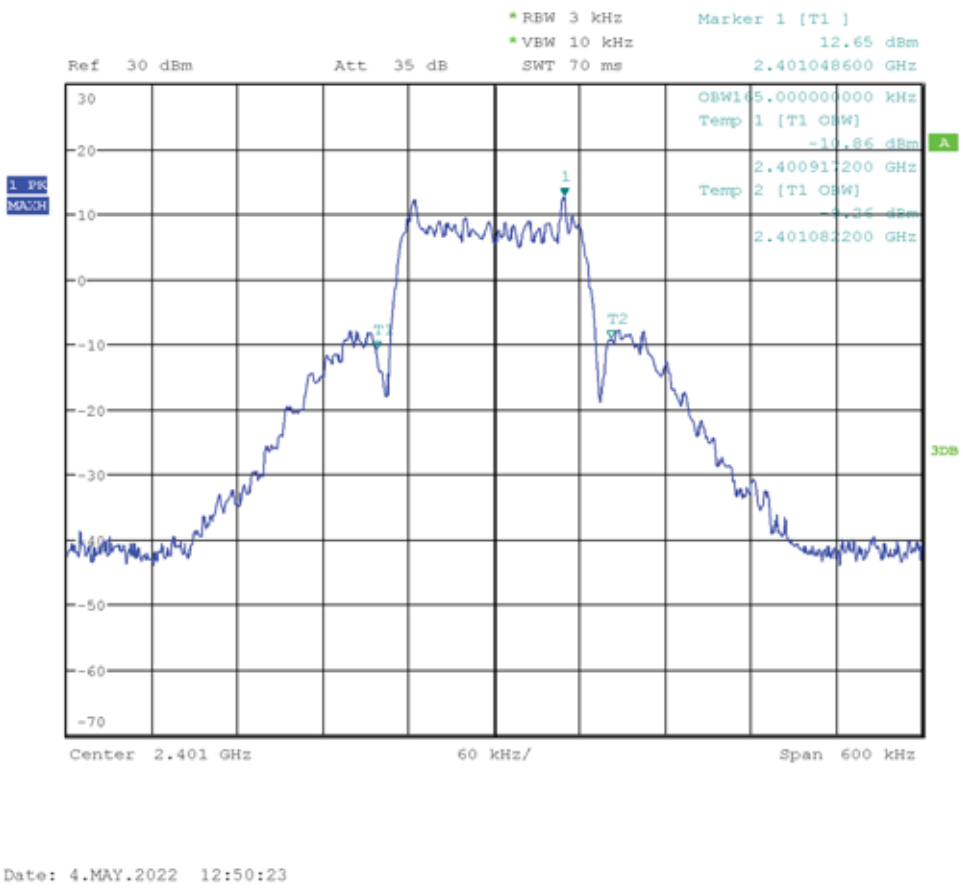
Occupied Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 160, 2477.32 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Occupied Bandwidth [MHz]:	0.167



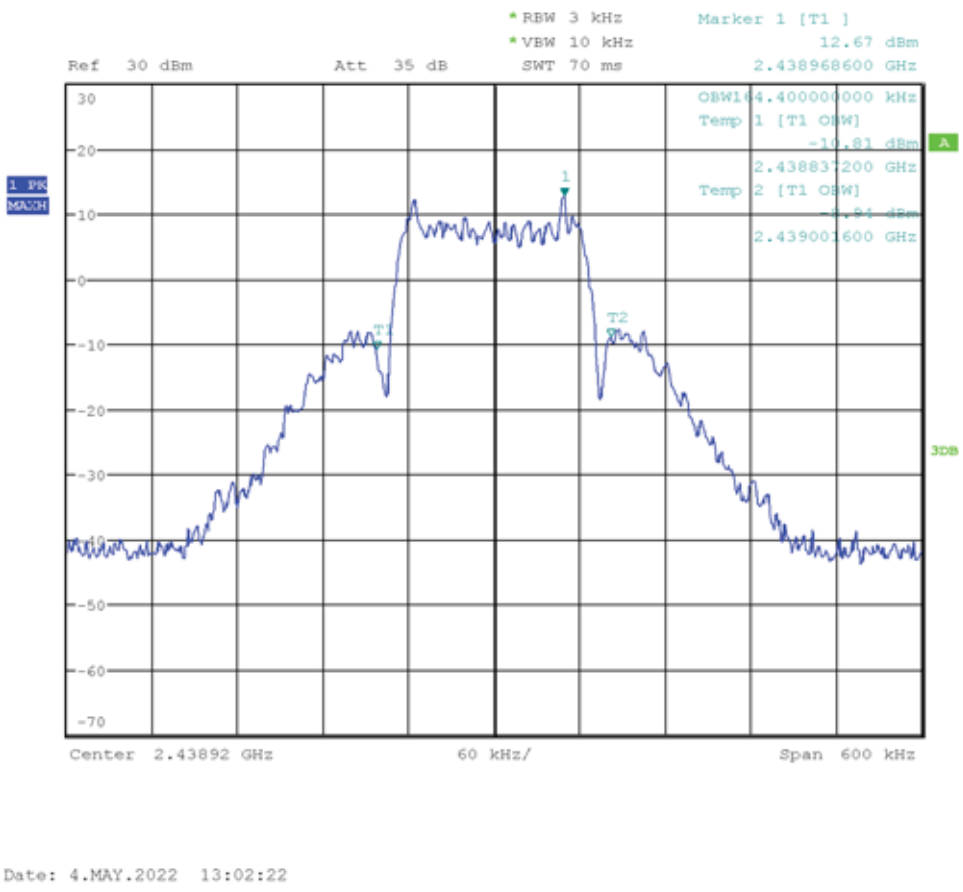
Occupied Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 1, 2401 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Occupied Bandwidth [MHz]:	0.165



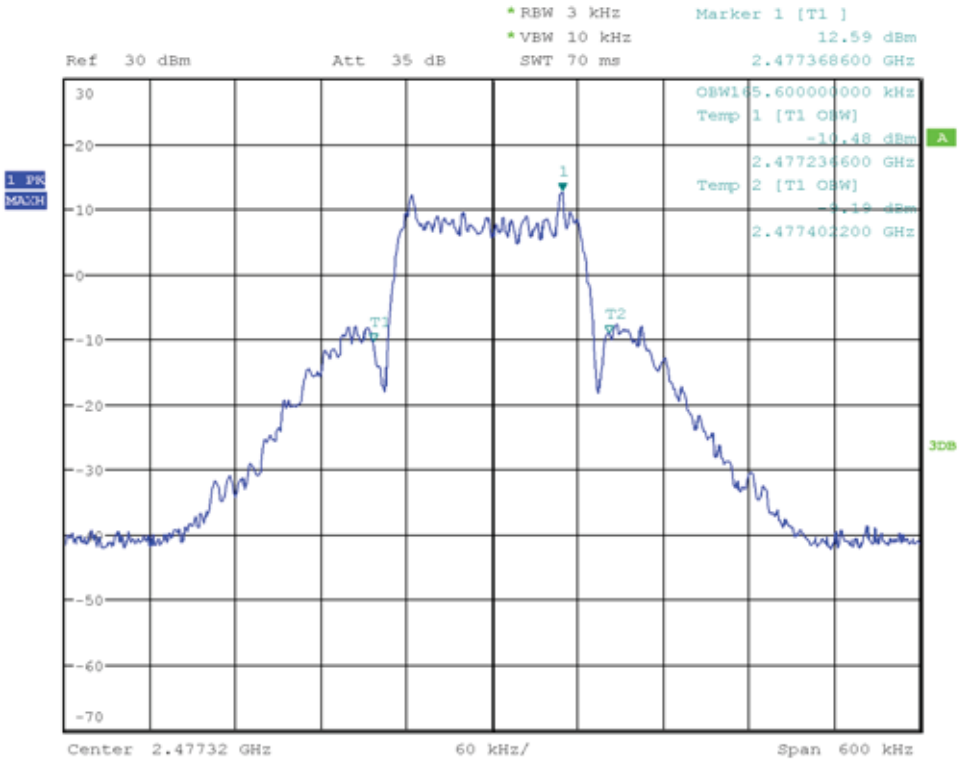
Occupied Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 80, 2438.92 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Occupied Bandwidth [MHz]:	0.165



Occupied Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 160, 2477.32 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Occupied Bandwidth [MHz]:	0.166



Date: 4.MAY.2022 13:03:53

3.2 Test Conditions and Results - 20 dB bandwidth

3.2.1 Information

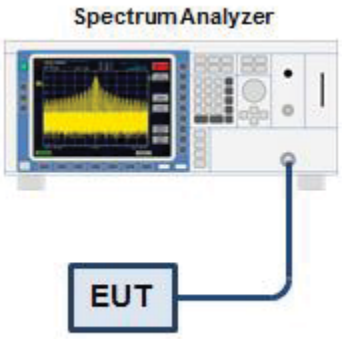
Test Information	
Reference	FCC 15.247(a)(1) / ISED RSS-247 5.1
Measurement Method	ANSI C63.10 6.9.2
Measurement Uncertainty	± 1.26 %
Test Sample ID	39318
Operator	Wilfried Treffke
Date	2022-04-12

3.2.2 Limits

Limits
None (Informational only)

3.2.3 Setup

Test Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	CAABI	EF00779	2022-02	2023-02

3.2.5 Procedure

Test Procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span set to at least twice the emission spectrum
3. Detector set to peak and max hold
4. Envelope peak value of emission spectrum is selected
5. Marker on envelope of spectrum is set to level of -20 dB to the left of the peak
6. Marker on envelope of spectrum is set to level of -20 dB to the right of the peak
7. 20dB Bandwidth is determined by marker frequency separation

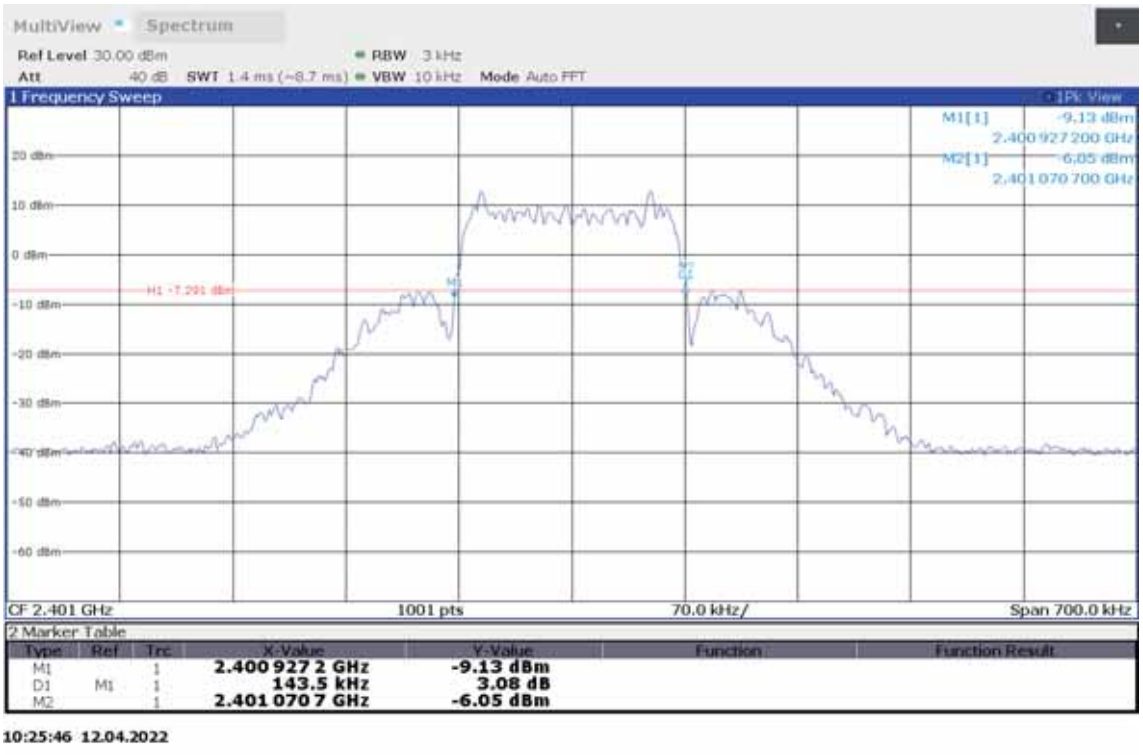
3.2.6 Results

Test Results – EUT 7.2 (ID 39318)		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK, Single	2401.00	0.144
GFSK, Single	2438.92	0.143
GFSK, Single	2477.32	0.144

Test Results – EUT 3.2 (ID 39314)		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK, Single	2401.00	0.144
GFSK, Single	2438.92	0.143
GFSK, Single	2477.32	0.144

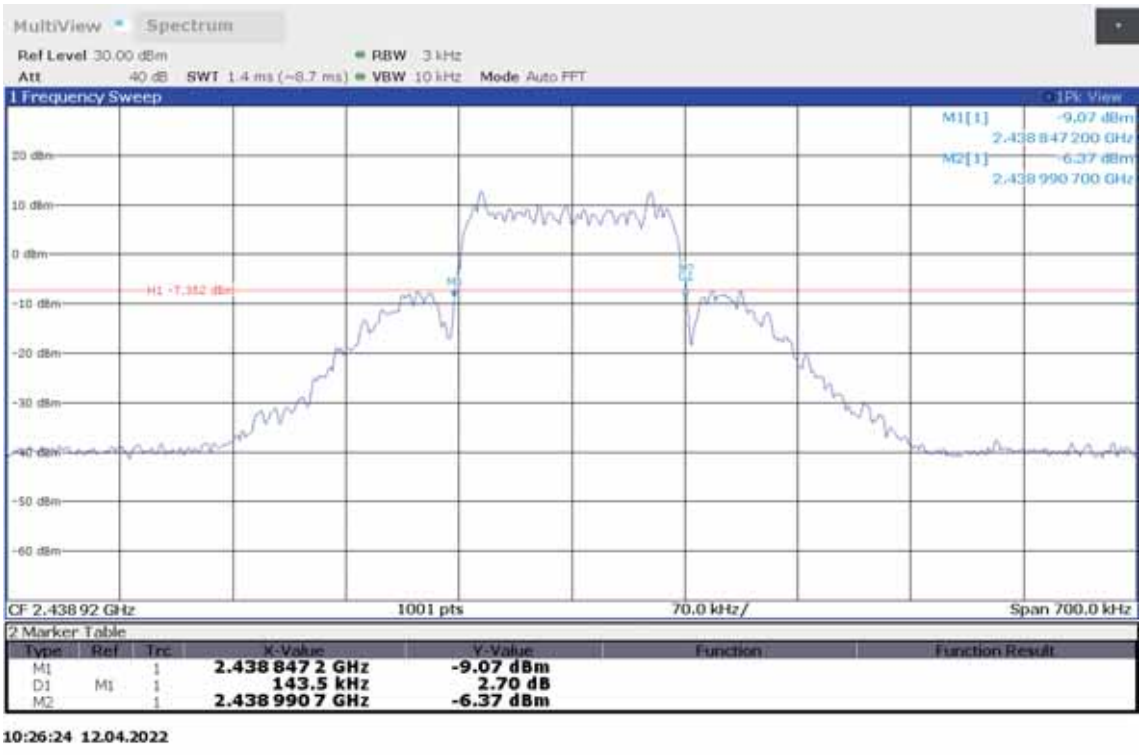
20 dB Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.2
Operational Mode:	GFSK, Channel: 1, 2401 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Lower Frequency [MHz]:	2400.927
Upper Frequency [MHz]:	2401.071
20 dB Bandwidth [MHz]:	0.144



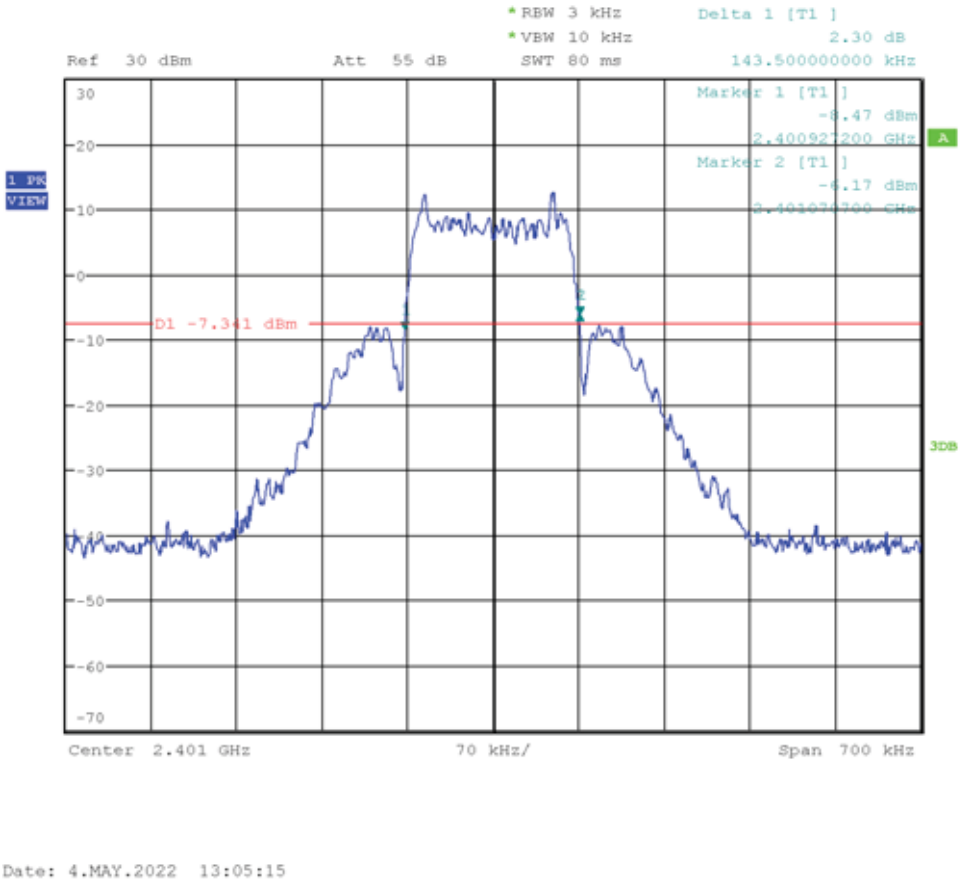
20 dB Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.2
Operational Mode:	GFSK, Channel: 80, 2438.92 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Lower Frequency [MHz]:	2438.847
Upper Frequency [MHz]:	2438.991
20 dB Bandwidth [MHz]:	0.143



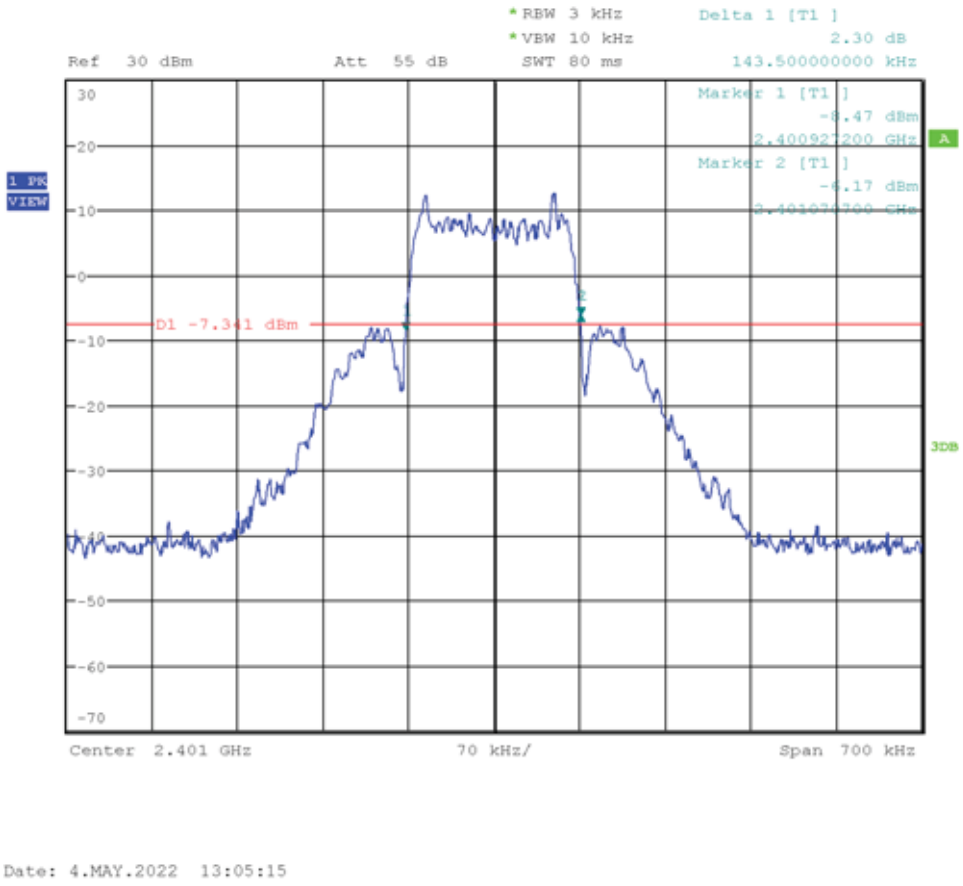
20 dB Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.2
Operational Mode:	GFSK, Channel: 160, 2477.32 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Lower Frequency [MHz]:	2477.247
Upper Frequency [MHz]:	2477.391
20 dB Bandwidth [MHz]:	0.144



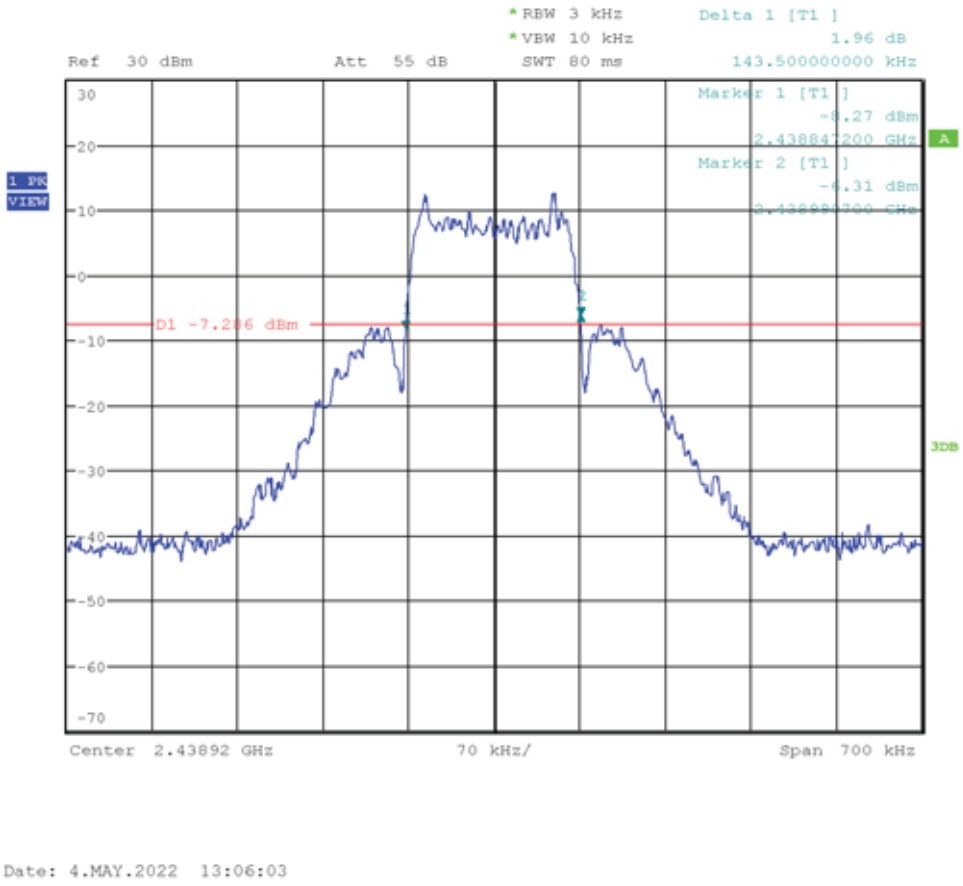
20 dB Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.2
Operational Mode:	GFSK, Channel: 1, 2401 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Lower Frequency [MHz]:	2400.927
Upper Frequency [MHz]:	2401.071
20 dB Bandwidth [MHz]:	0.144



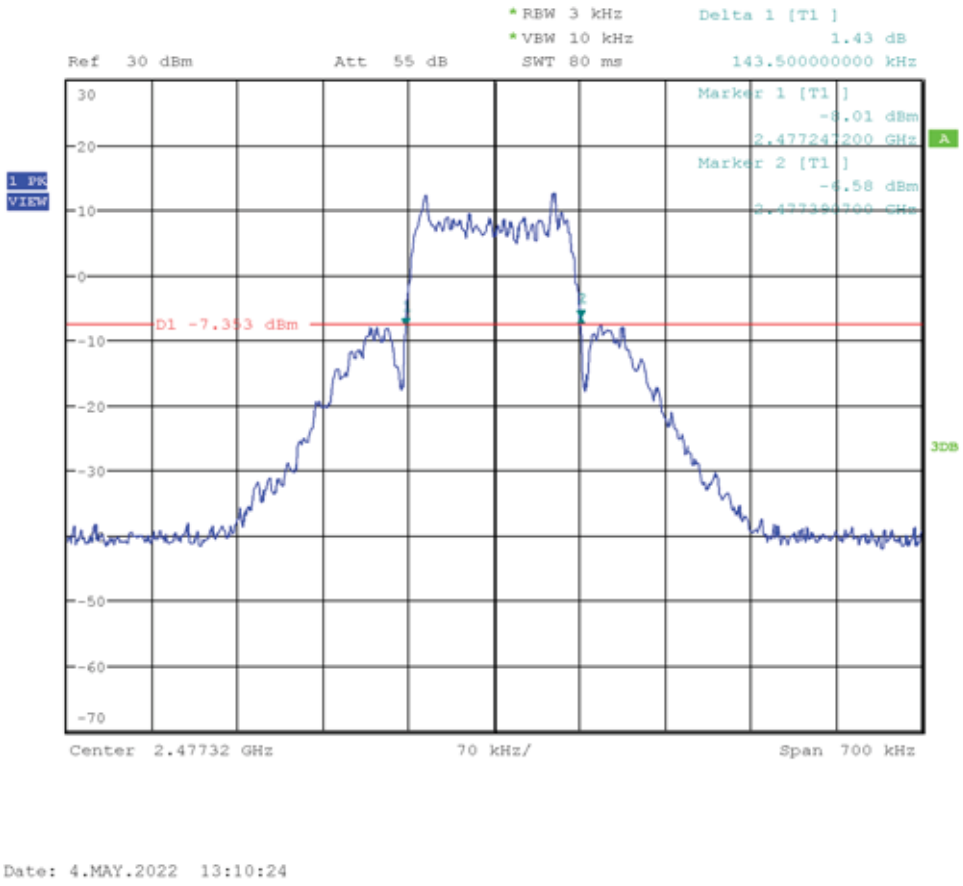
20 dB Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.2
Operational Mode:	GFSK, Channel: 80, 2438.92 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Lower Frequency [MHz]:	2438.847
Upper Frequency [MHz]:	2438.991
20 dB Bandwidth [MHz]:	0.143



20 dB Bandwidth

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.2
Operational Mode:	GFSK, Channel: 160, 2477.32 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Lower Frequency [MHz]:	2477.247
Upper Frequency [MHz]:	2477.391
20 dB Bandwidth [MHz]:	0.144



3.3 Test Conditions and Results - Number of hopping frequencies

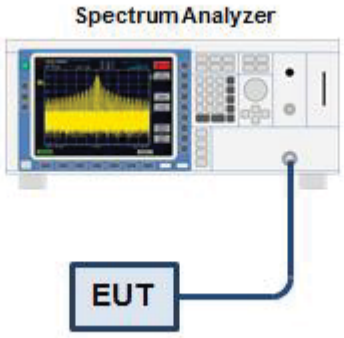
3.3.1 Information

Test Information	
Reference	FCC § 15.247(a)(1)(iii); ISED RSS-247, Issue 2 (section 5.1)
Measurement Method	ANSI C63.10 7.8.3
Operator	Wilfried Treffke
Date	2022-04-12

3.3.2 Limits

Limits
≥ 15

3.3.3 Setup

Test Setup


3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	CAABI	EF00779	2022-02	2023-02

3.3.5 Procedure

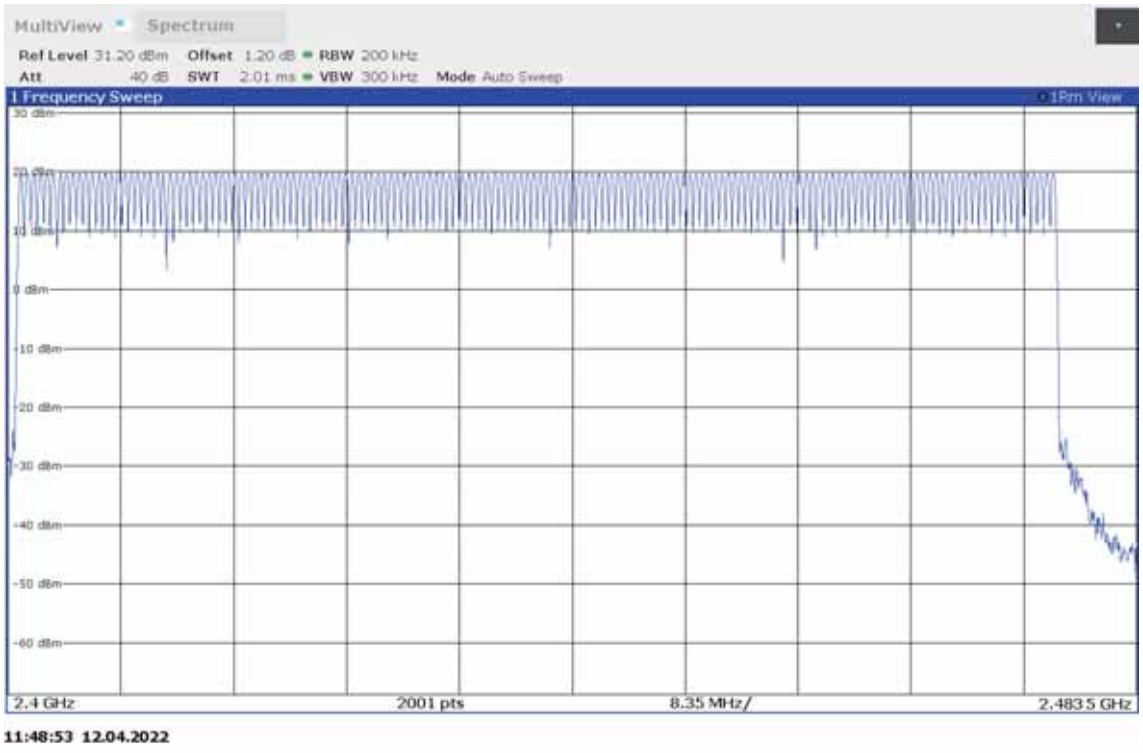
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set to measurement frequency range 3. Detector set to peak and max hold 4. Resolution bandwidth is set small enough to resolve hopping channel emission spectra 5. The number of peaks is counted to determine number of hopping frequencies

3.3.6 Results

Test Results		
Number of hopping frequencies	Limit	Verdict
160	>15	PASS

Number of hopping frequencies

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.27 (a)(1)(iii)
Reference Method:	ANSI C63.10:2013 7.8.3
Operational Mode:	GFSK, Hopping 1
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Number of Hopping Channels:	160



3.4 Test Conditions and Results - Frequency hopping channel separation

3.4.1 Information

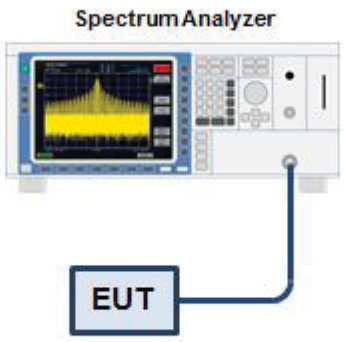
Test Information	
Reference	FCC § 15.247(a)(1); ISED RSS-247, Issue 2 (section 5.1)
Measurement Method	ANSI C63.10 7.8.4
Measurement Uncertainty	± 3.14 %
Operator	Wilfried Treffke
Date	2022-04-12

3.4.2 Limits

Limit
≥ 25 kHz or ⅔ of 20 dB bandwidth

3.4.3 Setup

Test Setup



3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	CAABI	EF00779	2022-02	2023-02

3.4.5 Procedure

Test Procedure

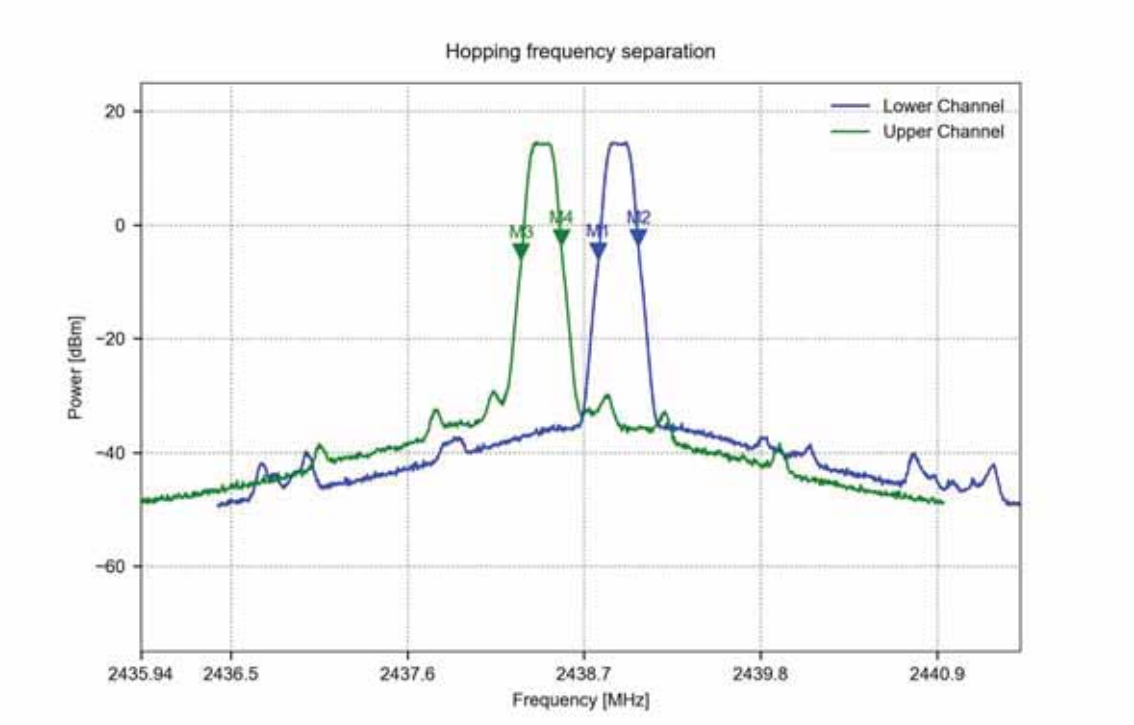
1. EUT set to test mode (Communication tester is used if needed)
2. Span set to measurement frequency range
3. Detector set to peak and max hold
4. Resolution bandwidth is set small enough to resolve hopping channel emission spectra
5. The two adjacent channel peaks are marked
6. Channel separation is determined from frequency separation of markers

3.4.6 Results

Test Results		
Channel separation [kHz]	Limit [kHz]	Verdict
480	≥ ⅔ · 143 = 95.3	PASS

Hopping frequency separation

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247(a)(1)
Reference Method:	ANSI C63.10:2013 7.8.2
Operational Mode:	GFSK, Single, Ch.: 2438.92 + 2438.44 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Lower Frequency (M1) [MHz]:	2438.790
Upper Frequency (M2) [MHz]:	2439.040
Lower Frequency (M3) [MHz]:	2438.310
Upper Frequency (M4) [MHz]:	2438.560
Lower center Frequency [MHz]:	2438.915
Upper center Frequency [MHz]:	2438.435
Hopping Frequency Separation [MHz]:	0.480



3.5 Test Conditions and Results - Time of occupancy (Dwell time)

3.5.1 Information

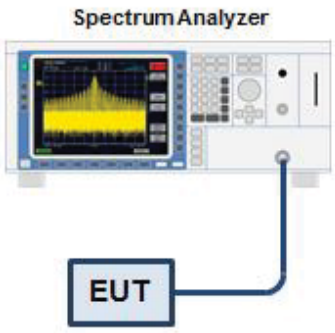
Test Information	
Reference	FCC § 15.247(a)(1)(iii); ISED RSS-247, Issue 2 (section 5.1)
Measurement Method	ANSI C63.10 7.8.4
Measurement Uncertainty	± 78.53 %
Operator	Wilfried Treffke
Date	2022-04-12

3.5.2 Limits

Limits
≤ 0.4 s within 0.4 s · Number of hopping channels

3.5.3 Setup

Test Setup



3.5.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	CAABI	EF00779	2022-02	2023-02

3.5.5 Procedure

Test Procedure

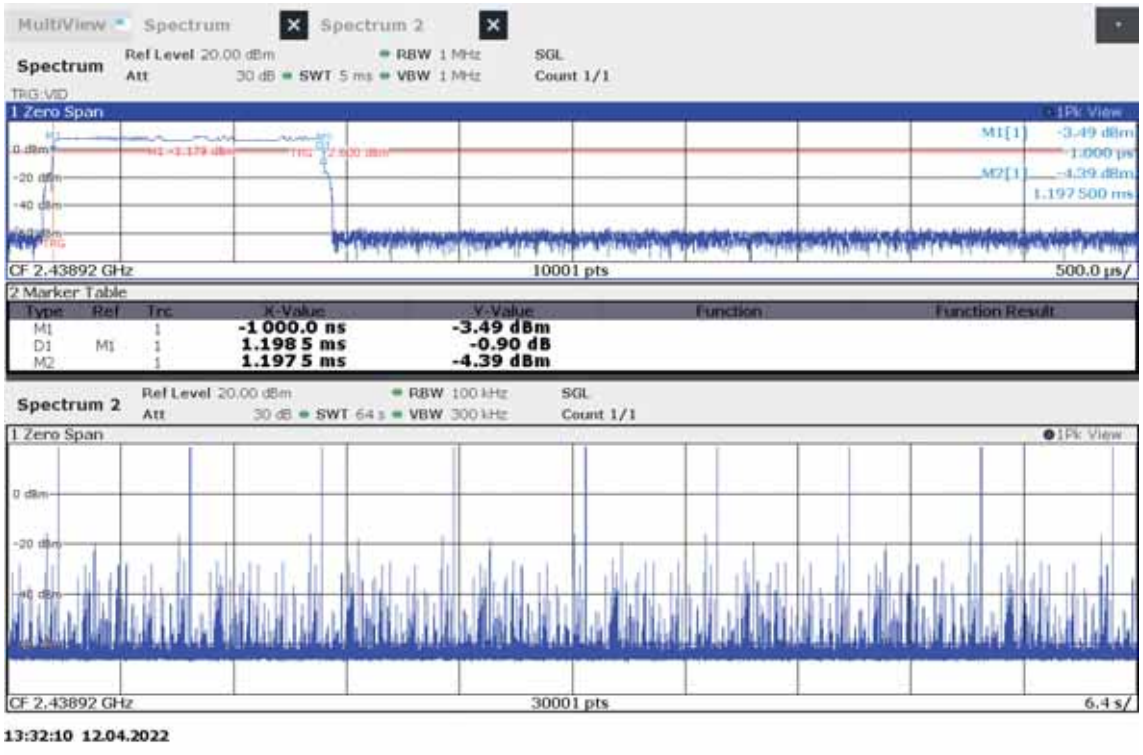
1. EUT set to test hopping mode (Communication tester is used if needed)
2. Analyser span is set to zero span
3. Detector set to peak and max hold
4. RBW is set to 100 kHz and VBW to 300 kHz
5. The sweep time is set to capture one single dwell time
6. Trigger is set to video trigger
7. A marker is set to the start and end positions of the burst
8. The dwell time is determined from the marker difference
9. Another sweep is initiated without trigger and sweep time set to the observation time
10. The number of hops is counted
11. The total time of occupancy is calculated from the dwell time per hop multiplied by the number of hops

3.5.6 Results

Test Results					
Observation Period [s]	Number of Hops	Dwell time per Hop [s]	Time of occupancy [s]	Limit [s]	Margin [s]
64	9	0.001198	0.011	0.4	-0.39

Time of occupancy

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Method:	ANSI C63.10:2013 7.8.4
Operational Mode:	GFSK, Hopping 2
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Dwell Time per Hop [ms]:	1.198
Number of Hops:	9
Time of occupancy [s]:	0.011



3.6 Test Conditions and Results - Maximum peak conducted output power

3.6.1 Information

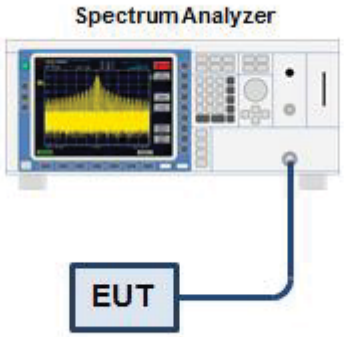
Test Information	
Reference	FCC § 15.247(b); ISED RSS-247, Issue 2 (section 5.4)
Measurement Method	ANSI C63.10 7.8.5
Measurement Uncertainty	± 2.86 dB
Operator	Wilfried Treffke
Date	2022-04-12

3.6.2 Limits

Limits	
Condition	Power
Number of hopping channels ≥ 75	1 W (30 dBm)
75 > Number of hopping channels ≥ 15	0.125 W (21 dBm)
The conducted output power limit specified above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in the table, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	

3.6.3 Setup

Test Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	CAABI	EF00779	2022-02	2023-02

3.6.5 Procedure

Test Procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Analyser resolution bandwidth is set ≥ DTS bandwidth
3. Detector set to peak and max hold
4. Sweep time is set to auto
5. After the trace has stabilized a marker is set to peak of envelope

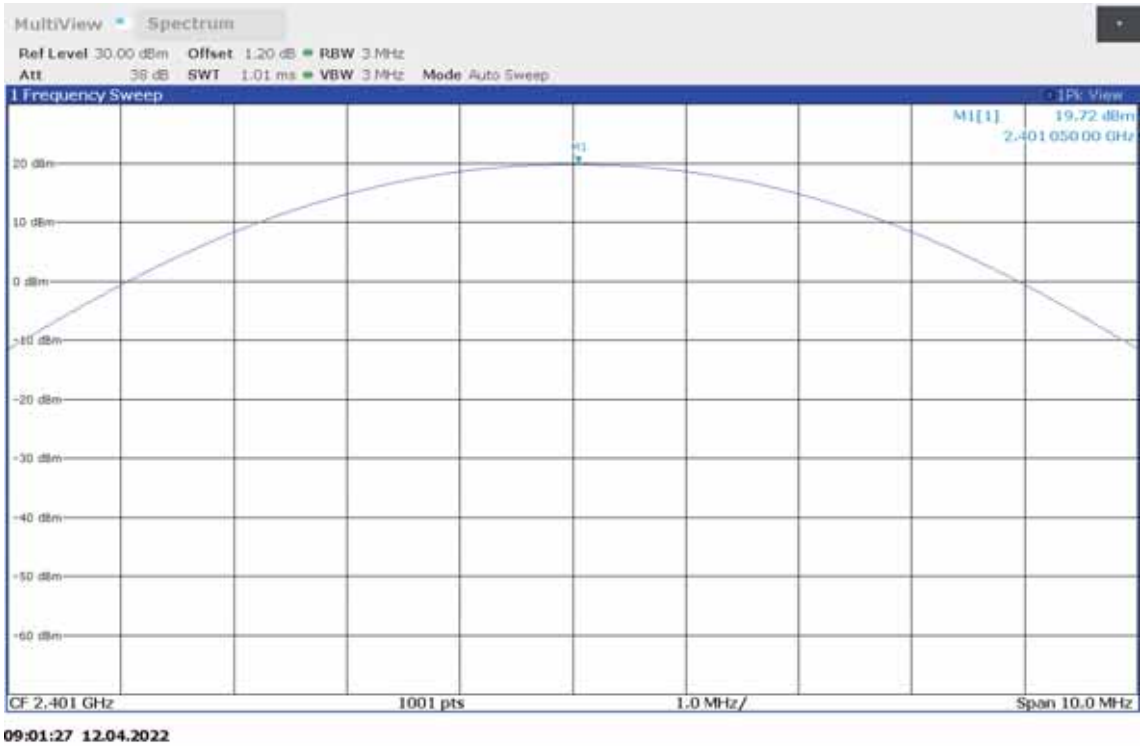
3.6.6 Results

Test Results – EUT 7.2 (ID 39318)				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2401.00	19.716	0.0937	1.0	PASS
2438.92	19.651	0.0923	1.0	PASS
2477.32	19.668	0.0926	1.0	PASS

Test Results – EUT 3.2 (ID 39314)				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2401.00	19.380	0.0867	1.0	PASS
2438.92	19.399	0.0871	1.0	PASS
2477.32	19.339	0.0859	1.0	PASS

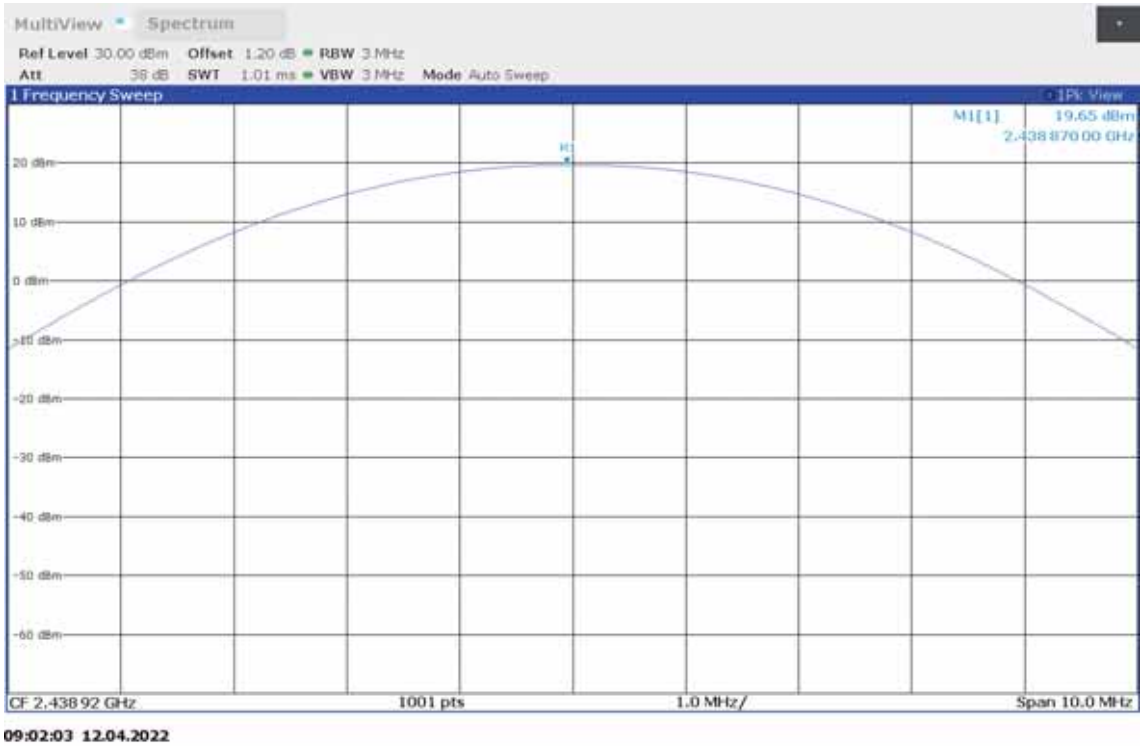
Peak Conducted Output Power

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.5
Operational Mode:	GFSK, Single, Ch.: 1, 2401 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Peak Power [dBm]:	19.716
Peak Power [W]:	0.0937



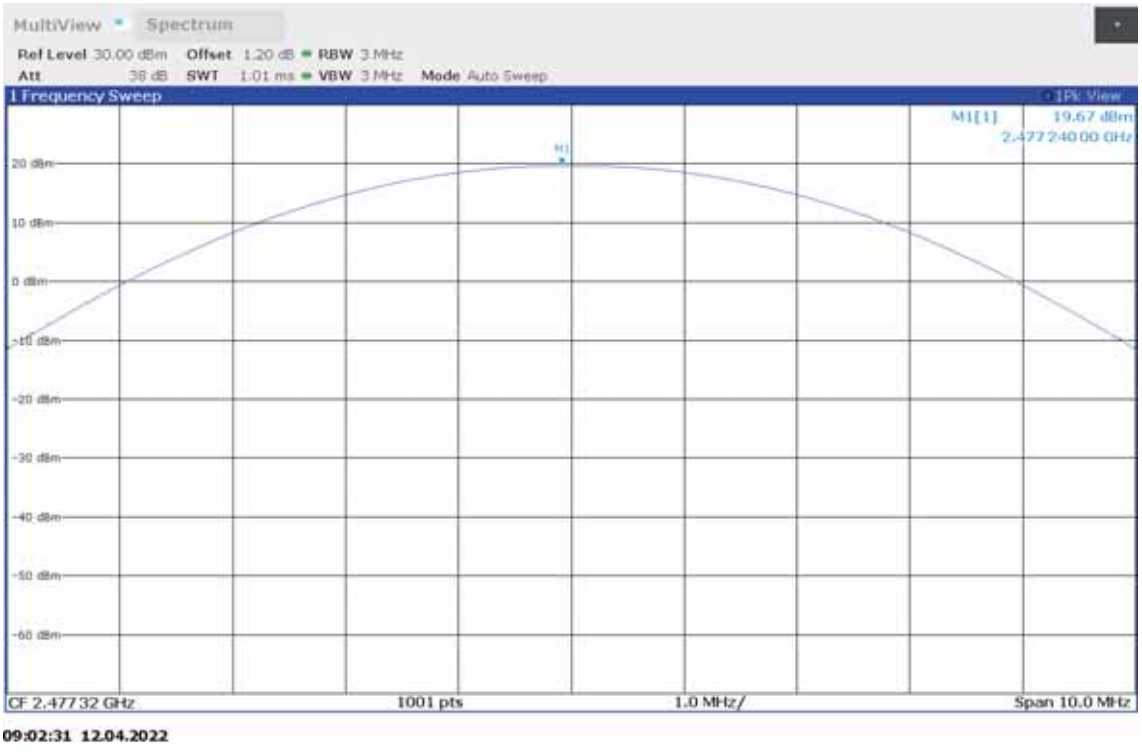
Peak Conducted Output Power

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.5
Operational Mode:	GFSK, Single, Ch.: 80, 2438.92 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Peak Power [dBm]:	19.651
Peak Power [W]:	0.0923



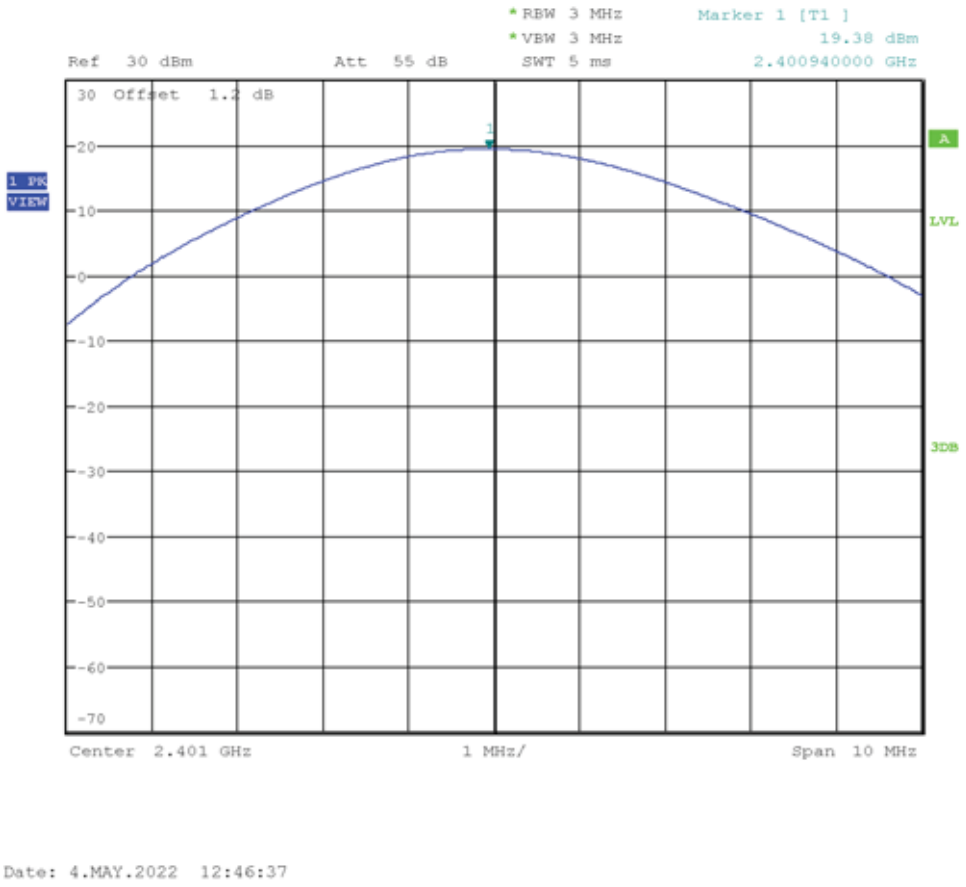
Peak Conducted Output Power

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.5
Operational Mode:	GFSK, Single, Ch.: 160, 2477.32 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Peak Power [dBm]:	19.668
Peak Power [W]:	0.0926



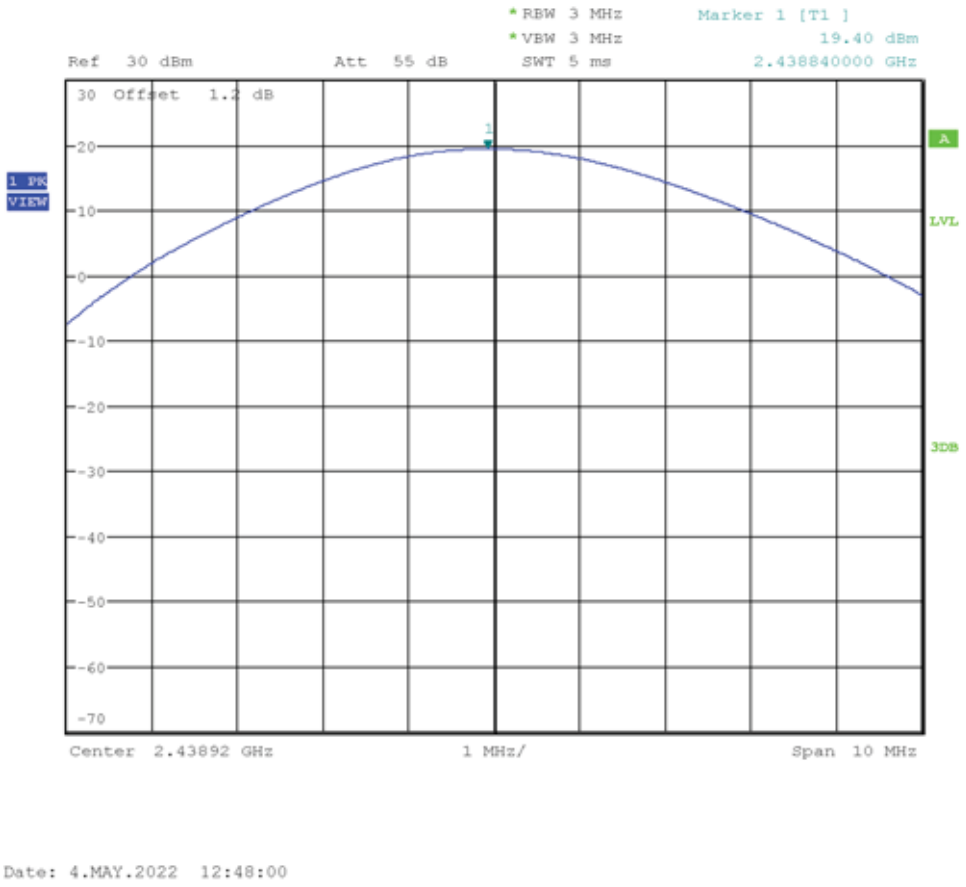
Peak Conducted Output Power

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.5
Operational Mode:	GFSK, Channel: 1, 2401 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Peak Power [dBm]:	19.380
Peak Power [W]:	0.0867



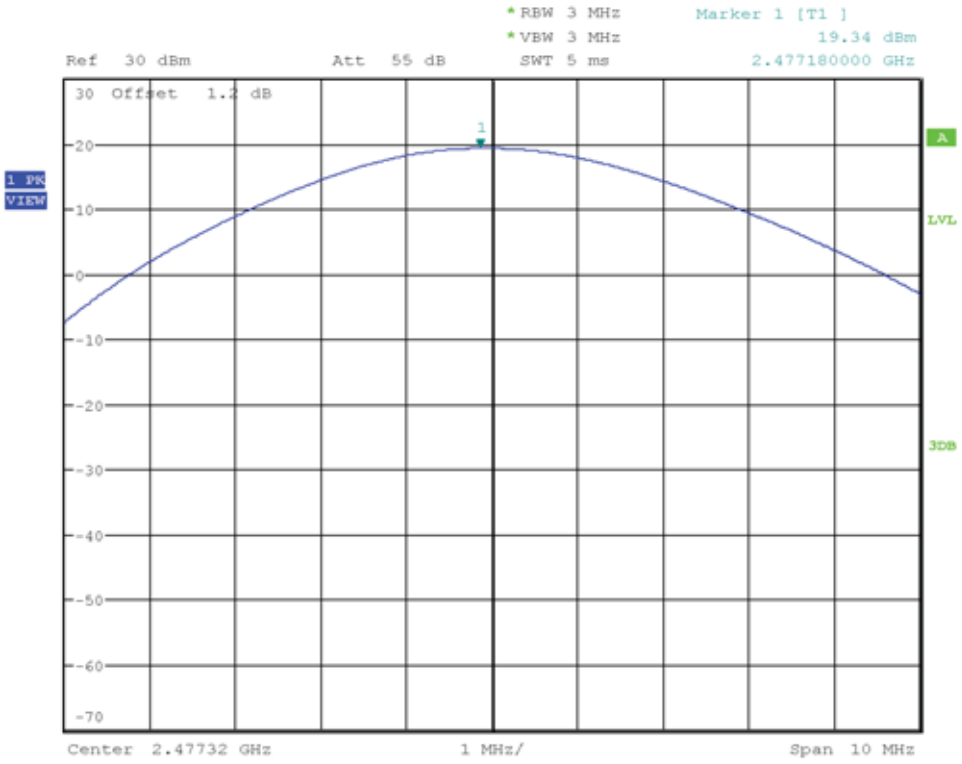
Peak Conducted Output Power

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.5
Operational Mode:	GFSK, Channel: 80, 2438.92 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Peak Power [dBm]:	19.399
Peak Power [W]:	0.0871



Peak Conducted Output Power

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.5
Operational Mode:	GFSK, Channel: 160, 2477.32 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Peak Power [dBm]:	19.339
Peak Power [W]:	0.0859



3.7 Test Conditions and Results - AC powerline conducted emissions

3.7.1 Information

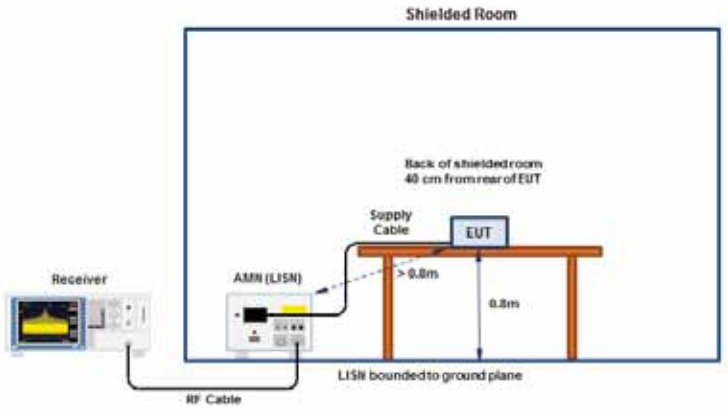
Test Information	
Reference	FCC § 15.207; ISED RSS-247, Issue 2 (section 3.1)
Measurement Method	ANSI C63.10 6.2
Measurement Uncertainty	± 3.82 dB
Operator	Mr. Qawasmeh
Date	2022-04-12

3.7.2 Limits

Limits		
Frequency [MHz]	Quasi-Peak [dBµV]	Average [dBµV]
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50
* Limit decreases linearly with the logarithm of the frequency		

3.7.3 Setup

Test Setup



3.7.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	R&S	ESR7	EF00943	2021-08	2022-08
Pulse Limiter	R&S	ESH3-Z2	EF01222	2021-07	2022-07
LISN	Schwarzbeck	NSLK 8127 RC	EF01592	2021-07	2022-07

Conducted emissions at the mains power port according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-04-05
Operating Conditions:	ambient temperature: 20 °Celsius power input: 3.7 VDC
LISN:	Schwarzbeck NSLK 8127 RC L
Operational Mode:	GFSK; 2401.0 MHz; Dipol coaxial antenna AA050031; EUT#7.2
EUT Configuration:	GFSK, Single
Applied to Port:	Mains, 120 VAC, 60 Hz
Note 1:	

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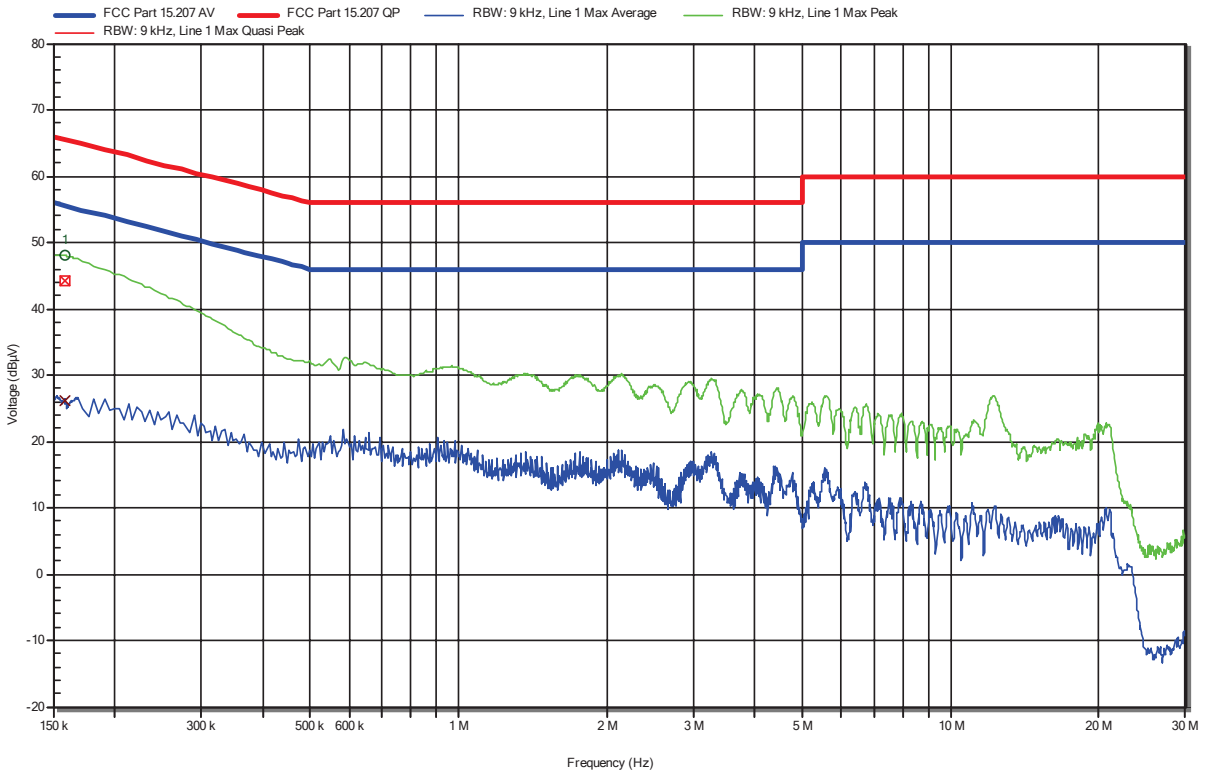
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	159 kHz	44.14 dBµV	65.52 dBµV	-21.37 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	159 kHz	26.11 dBµV	55.52 dBµV	-29.41 dB	Pass	Line 1

Conducted emissions at the mains power port according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-04-05
Operating Conditions:	ambient temperature: 20 °Celsius power input: 3.7 VDC
LISN:	Schwarzbeck NSLK 8127 RC N
Operational Mode:	GFSK; 2401.0 MHz; Dipol coaxial antenna AA050031; EUT#7.2
EUT Configuration:	GFSK, Single
Applied to Port:	Mains, 120 VAC, 60 Hz
Note 1:	

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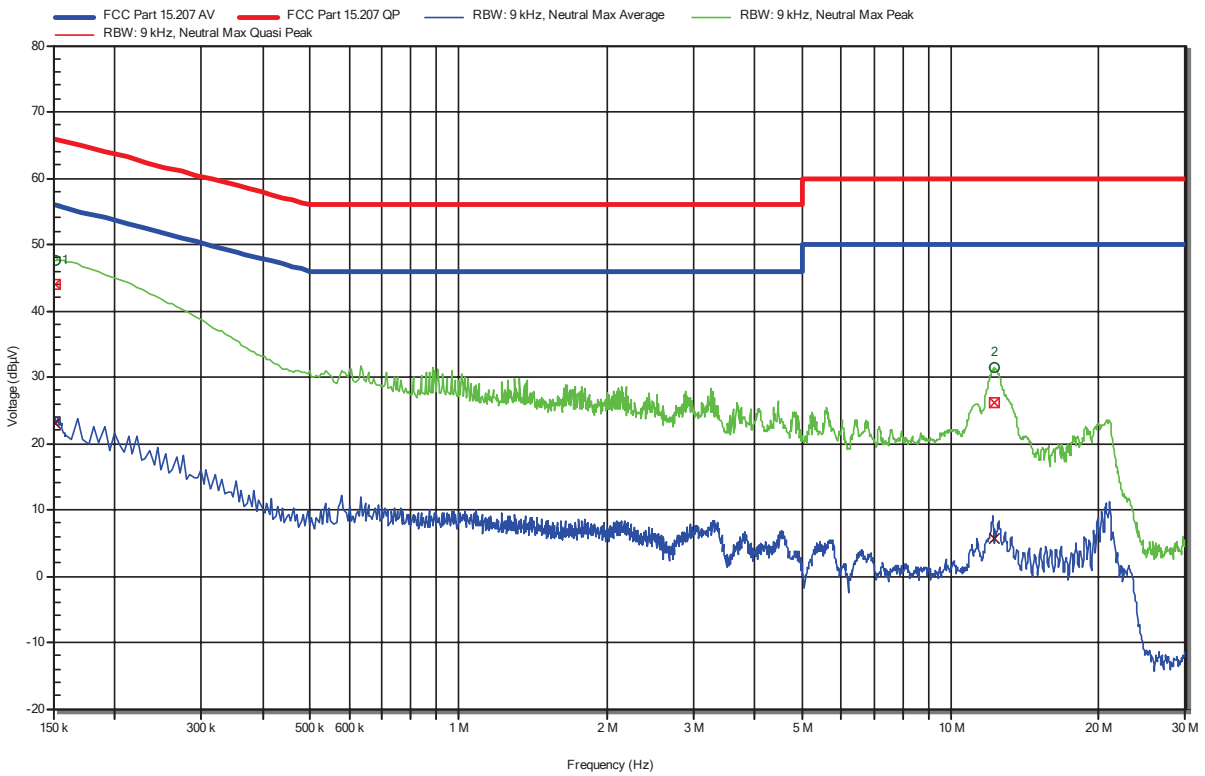
RadiMation

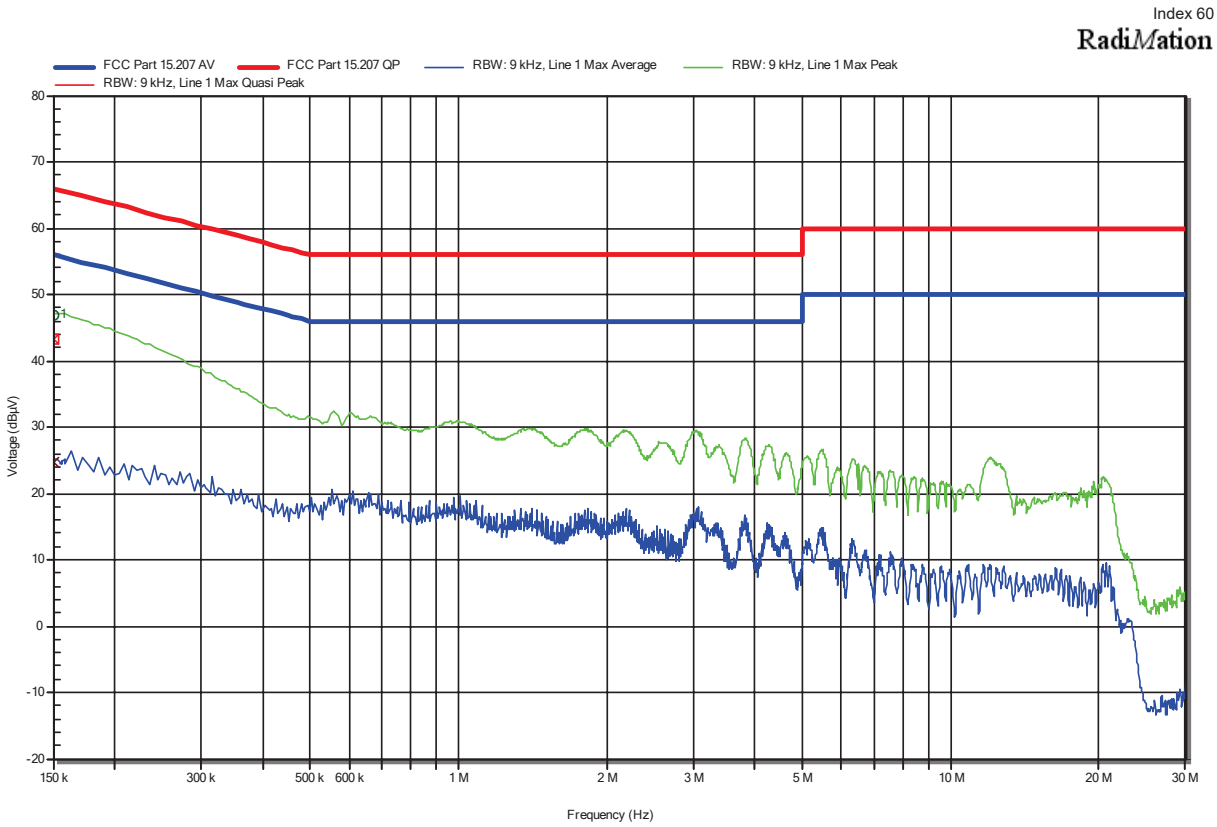


Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	152.25 kHz	44.09 dBµV	65.88 dBµV	-21.79 dB	Pass	Neutral
2	12.233 MHz	26.2 dBµV	60 dBµV	-33.8 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	152.25 kHz	23.13 dBµV	55.88 dBµV	-32.75 dB	Pass	Neutral
2	12.233 MHz	5.62 dBµV	50 dBµV	-44.38 dB	Pass	Neutral

Conducted emissions at the mains power port according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-04-05
Operating Conditions:	ambient temperature: 20 °Celsius power input: 3.7 VDC
LISN:	Schwarzbeck NSLK 8127 RC L
Operational Mode:	GFSK; 2438.92 MHz; Dipol coaxial antenna AA050031; EUT#7.2
EUT Configuration:	GFSK, Single
Applied to Port:	Mains, 120 VAC, 60 Hz
Note 1:	

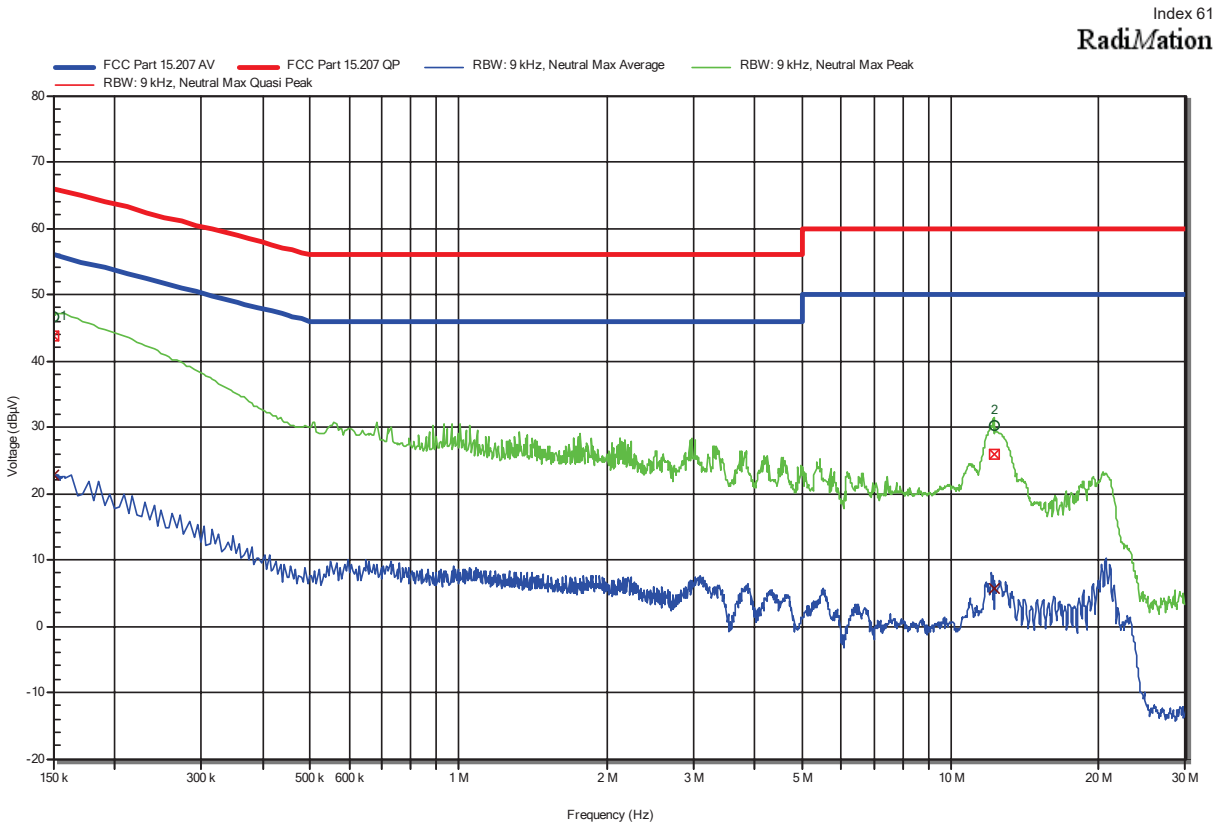


Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	150 kHz	43.27 dBµV	66 dBµV	-22.73 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150 kHz	24.69 dBµV	56 dBµV	-31.31 dB	Pass	Line 1

Conducted emissions at the mains power port according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-04-05
Operating Conditions:	ambient temperature: 20 °Celsius power input: 3.7 VDC
LISN:	Schwarzbeck NSLK 8127 RC N
Operational Mode:	GFSK; 2438.92 MHz; Dipol coaxial antenna AA050031; EUT#7.2
EUT Configuration:	GFSK, Single
Applied to Port:	Mains, 120 VAC, 60 Hz
Note 1:	



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	150 kHz	43.84 dBµV	66 dBµV	-22.16 dB	Pass	Neutral
2	12.228 MHz	25.95 dBµV	60 dBµV	-34.05 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150 kHz	22.71 dBµV	56 dBµV	-33.29 dB	Pass	Neutral
2	12.228 MHz	5.73 dBµV	50 dBµV	-44.27 dB	Pass	Neutral

Conducted emissions at the mains power port according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-04-05
Operating Conditions:	ambient temperature: 20 °Celsius power input: 3.7 VDC
LISN:	Schwarzbeck NSLK 8127 RC L
Operational Mode:	GFSK; 2477.32 MHz; Dipol coaxial antenna AA050031; EUT#7.2
EUT Configuration:	GFSK, Single
Applied to Port:	Mains, 120 VAC, 60 Hz
Note 1:	

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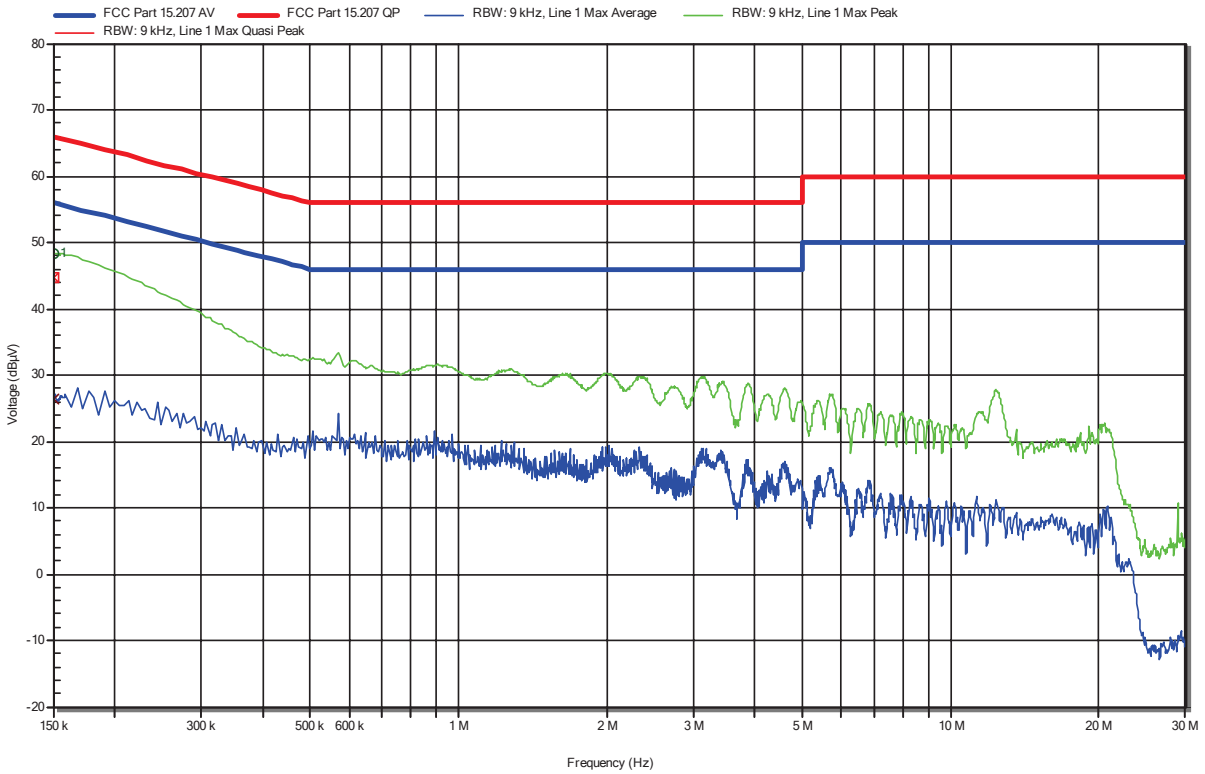
RadiMation

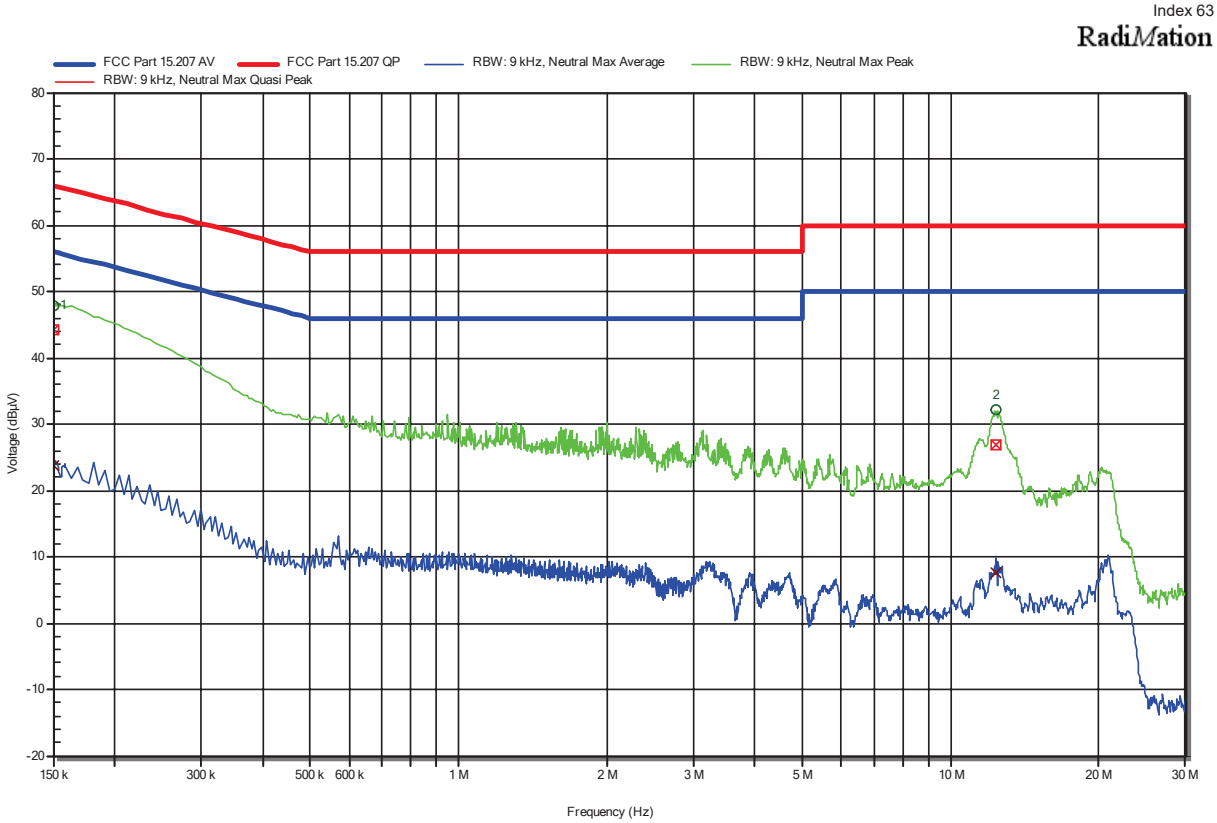


Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	150 kHz	44.65 dBµV	66 dBµV	-21.35 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150 kHz	26.47 dBµV	56 dBµV	-29.53 dB	Pass	Line 1

Conducted emissions at the mains power port according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-04-05
Operating Conditions:	ambient temperature: 20 °Celsius power input: 3.7 VDC
LISN:	Schwarzbeck NSLK 8127 RC N
Operational Mode:	GFSK; 2477.32 MHz; Dipol coaxial antenna AA050031; EUT#7.2
EUT Configuration:	GFSK, Single
Applied to Port:	Mains, 120 VAC, 60 Hz
Note 1:	



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	150 kHz	44.27 dBµV	66 dBµV	-21.73 dB	Pass	Neutral
2	12.404 MHz	26.93 dBµV	60 dBµV	-33.07 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	150 kHz	23.75 dBµV	56 dBµV	-32.25 dB	Pass	Neutral
2	12.404 MHz	7.7 dBµV	50 dBµV	-42.3 dB	Pass	Neutral

Conducted emissions at the mains power port according to RSS-247 Issue 2

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-04-05
Operating Conditions:	ambient temperature: 20 °Celsius power input: 3.7 VDC
LISN:	Schwarzbeck NSLK 8127 RC L
Operational Mode:	Receive, 2438.92 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Applied to Port:	Mains, 120 VAC, 60 Hz
Note 1:	

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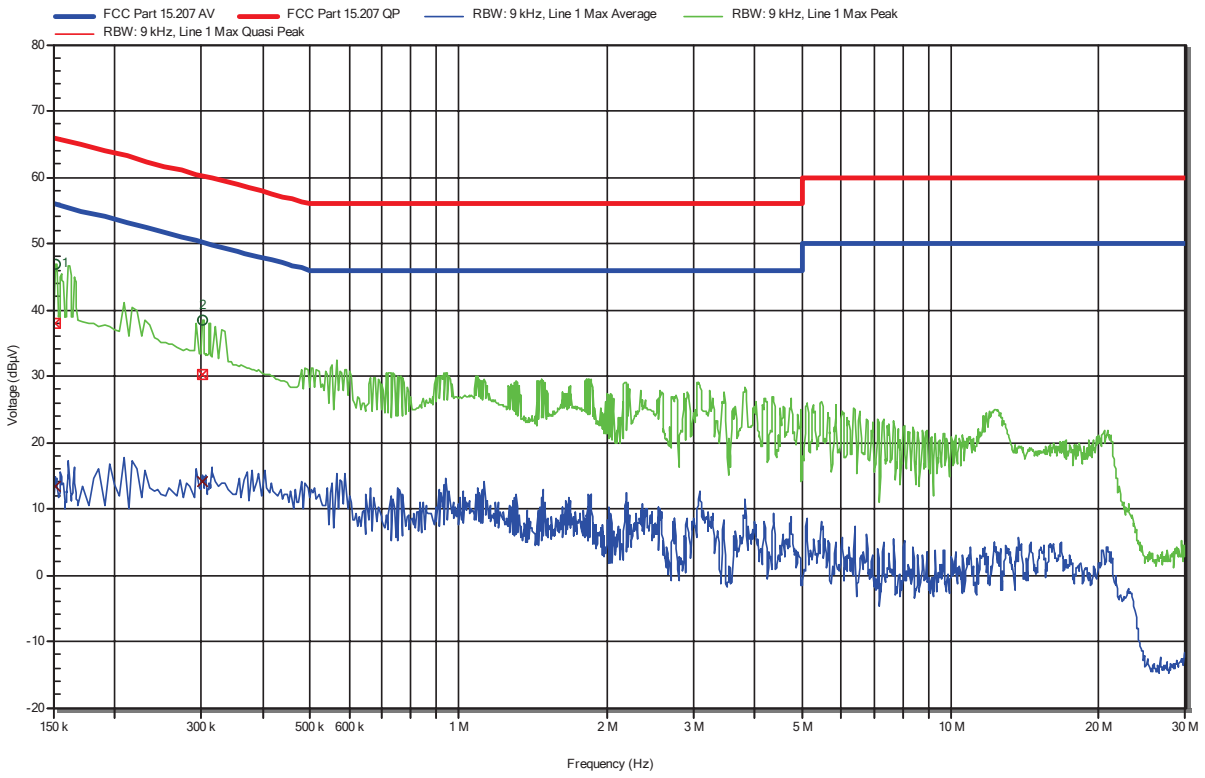
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	151.8 kHz	37.91 dBµV	65.9 dBµV	-27.99 dB	Pass	Line 1
2	302.1 kHz	30.17 dBµV	60.18 dBµV	-30.01 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	151.8 kHz	13.43 dBµV	55.9 dBµV	-42.47 dB	Pass	Line 1
2	302.1 kHz	14.01 dBµV	50.18 dBµV	-36.17 dB	Pass	Line 1

Conducted emissions at the mains power port according to RSS-247 Issue 2

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Test Date:	2022-04-05
Operating Conditions:	ambient temperature: 20 °Celsius power input: 3.7 VDC
LISN:	Schwarzbeck NSLK 8127 RC N
Operational Mode:	Receive, 2438.92 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Applied to Port:	Mains
Note 1:	

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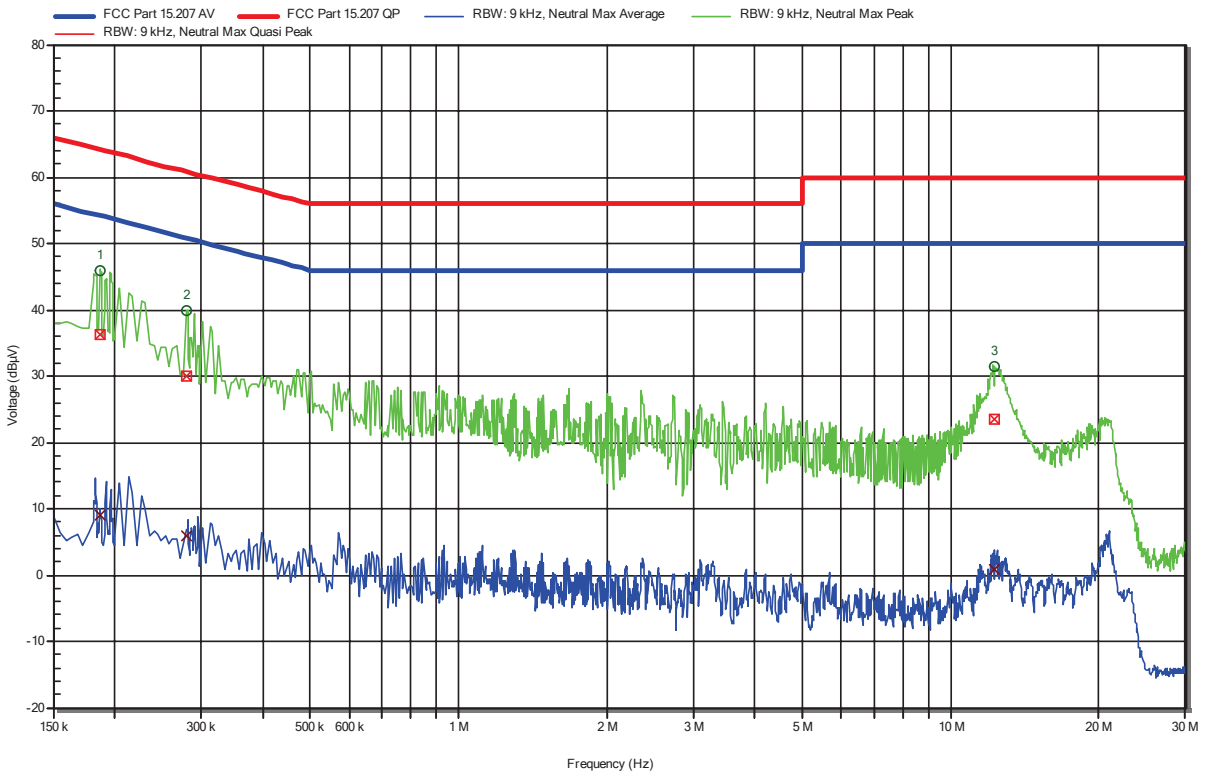
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	187.35 kHz	36.35 dBµV	64.15 dBµV	-27.8 dB	Pass	Neutral
2	280.5 kHz	29.97 dBµV	60.8 dBµV	-30.84 dB	Pass	Neutral
3	12.224 MHz	23.59 dBµV	60 dBµV	-36.41 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	187.35 kHz	9.08 dBµV	54.15 dBµV	-45.08 dB	Pass	Neutral
2	280.5 kHz	5.86 dBµV	50.8 dBµV	-44.94 dB	Pass	Neutral
3	12.224 MHz	0.77 dBµV	50 dBµV	-49.23 dB	Pass	Neutral

3.7.5 Setup Photos

Setup for measurements 150 kHz - 30 MHz


Setup for measurements 150 kHz - 30 MHz (2)


3.8 Test Conditions and Results - Band-edge compliance

3.8.1 Information

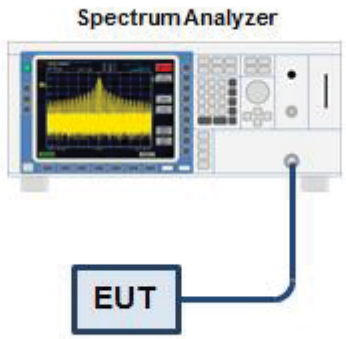
Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Uncertainty	± 3.64 dB
Measurement Method	ANSI C63.10 6.10
Operator	Wilfried Treffke
Date	2022-04-12

3.8.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.8.3 Setup

Test Setup



3.8.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	CAABI	EF00779	2022-02	2023-02

3.8.5 Procedure

Test Procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels within frequency band and outside frequency band
5. Band edge attenuation is determined from level difference

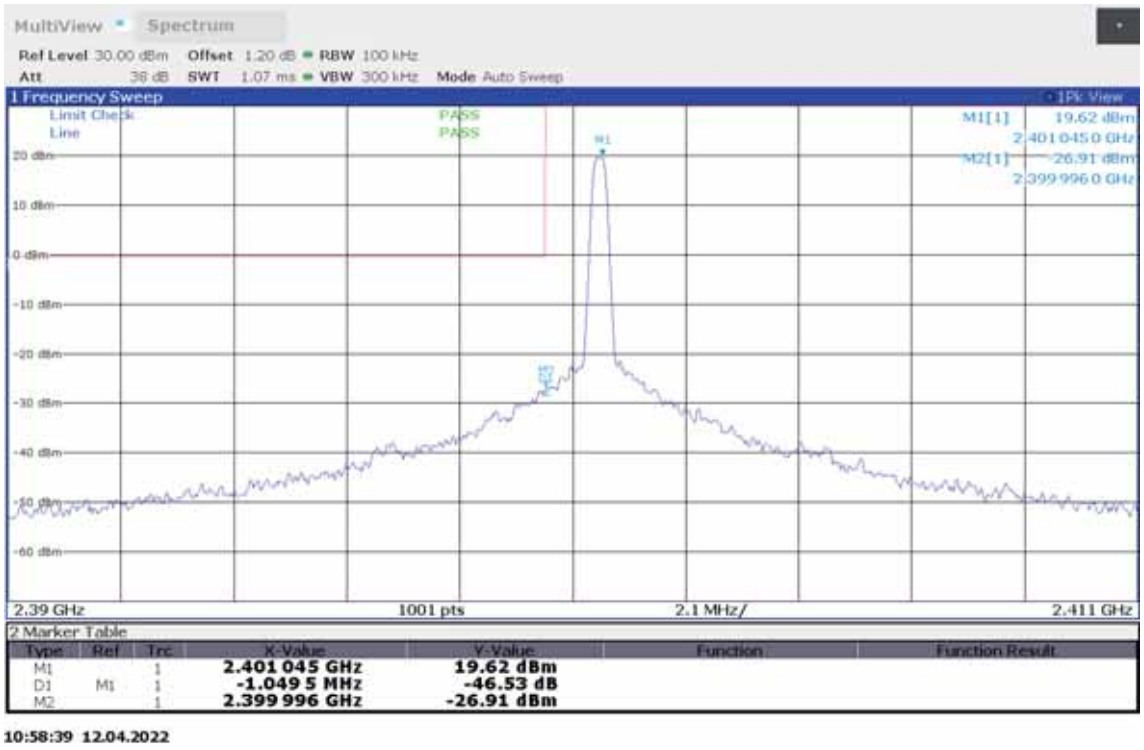
3.8.6 Results

Test Results – EUT 7.2 (ID 39318)				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
GFSK single	2401.00	-46.53	-20	PASS
GFSK single	2477.32	-65.19	-20	PASS
GFSK hopping	2401.00	-48.99	-20	PASS
GFSK hopping	2477.32	-63.64	-20	PASS

Test Results – EUT 3.2 (ID 39314)				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
GFSK single	2401.00	-45.84	-20	PASS
GFSK single	2477.32	-47.17	-20	PASS
GFSK hopping	2401.00	-47.99	-20	PASS
GFSK hopping	2477.32	-63.64	-20	PASS

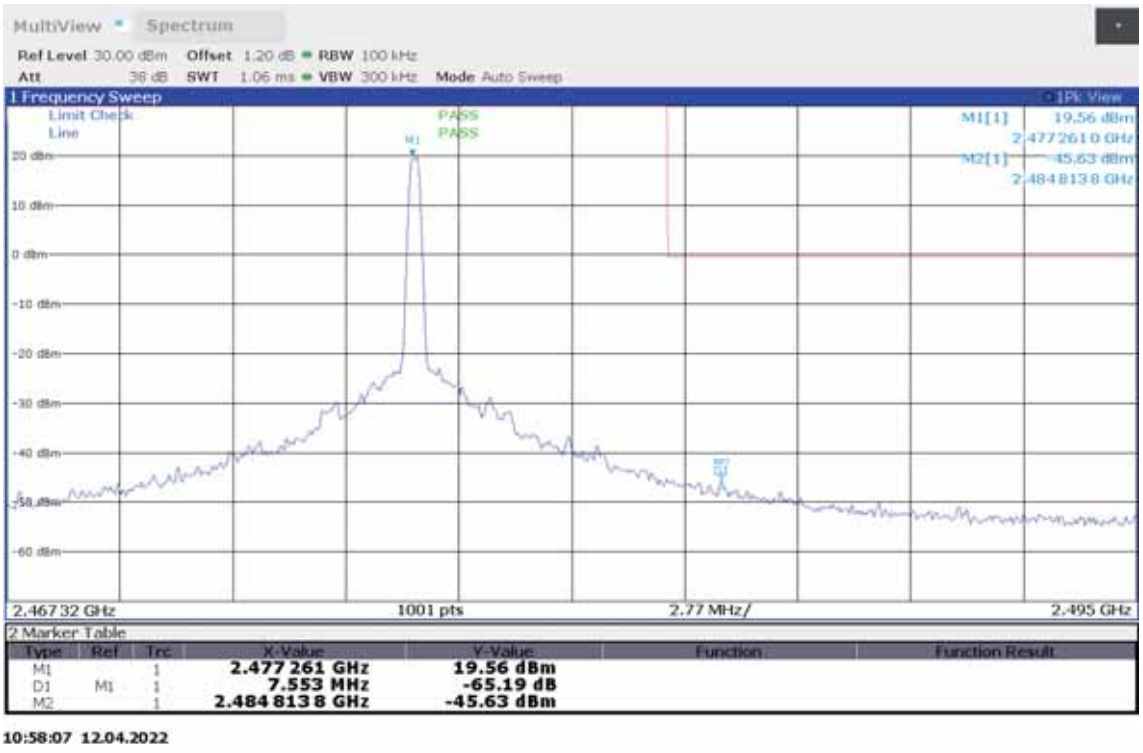
Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operational Mode:	GFSK, Channel: 1, 2401 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Band-edge	Lower
In-band Frequency [MHz]:	2401.045
Max. in-band Level [dBm/100 kHz]:	19.623
Out-of-band Frequency [MHz]:	2399.996
Max. out-of-band Level [dBm/100 kHz]:	-26.91
Attenuation [dB]:	-46.53



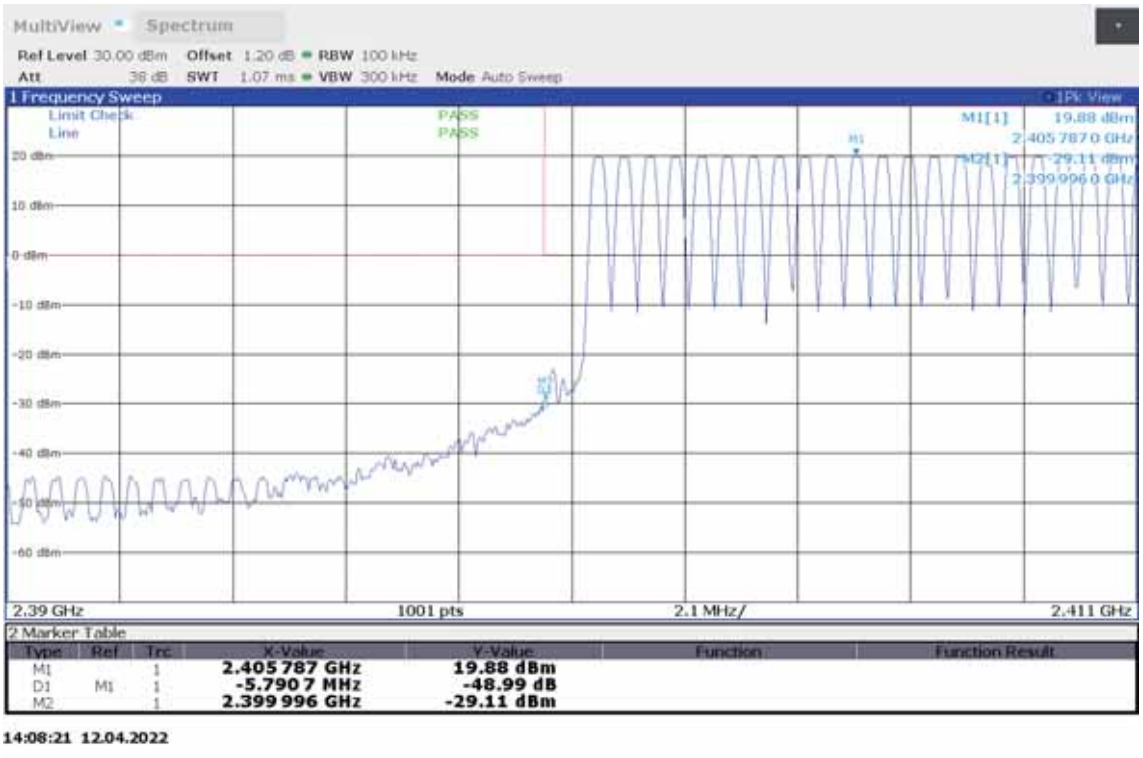
Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operational Mode:	GFSK, Channel: 160, 2477.32 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Band-edge	Upper
In-band Frequency [MHz]:	2477.261
Max. in-band Level [dBm/100 kHz]:	19.564
Out-of-band Frequency [MHz]:	2484.814
Max. out-of-band Level [dBm/100 kHz]:	-45.63
Attenuation [dB]:	-65.19



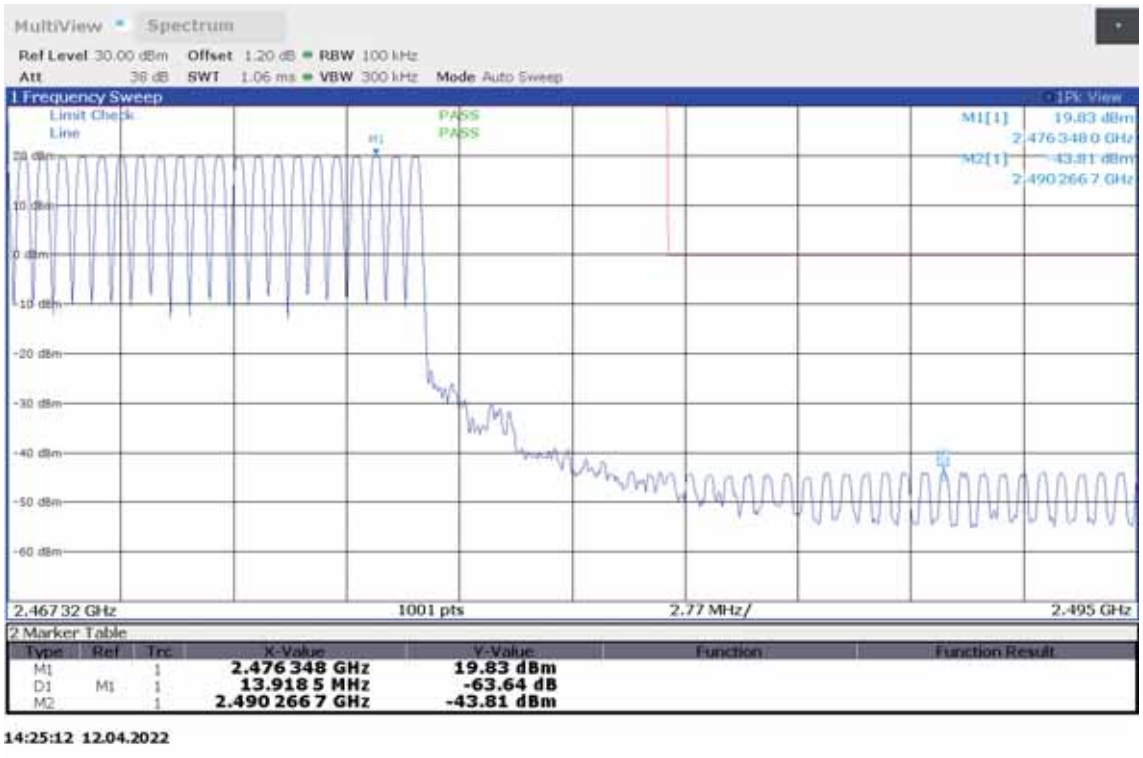
Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operational Mode:	GFSK, Hopping
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Band-edge	Lower
In-band Frequency [MHz]:	2405.787
Max. in-band Level [dBm/100 kHz]:	19.878
Out-of-band Frequency [MHz]:	2399.996
Max. out-of-band Level [dBm/100 kHz]:	-29.113
Attenuation [dB]:	-48.99



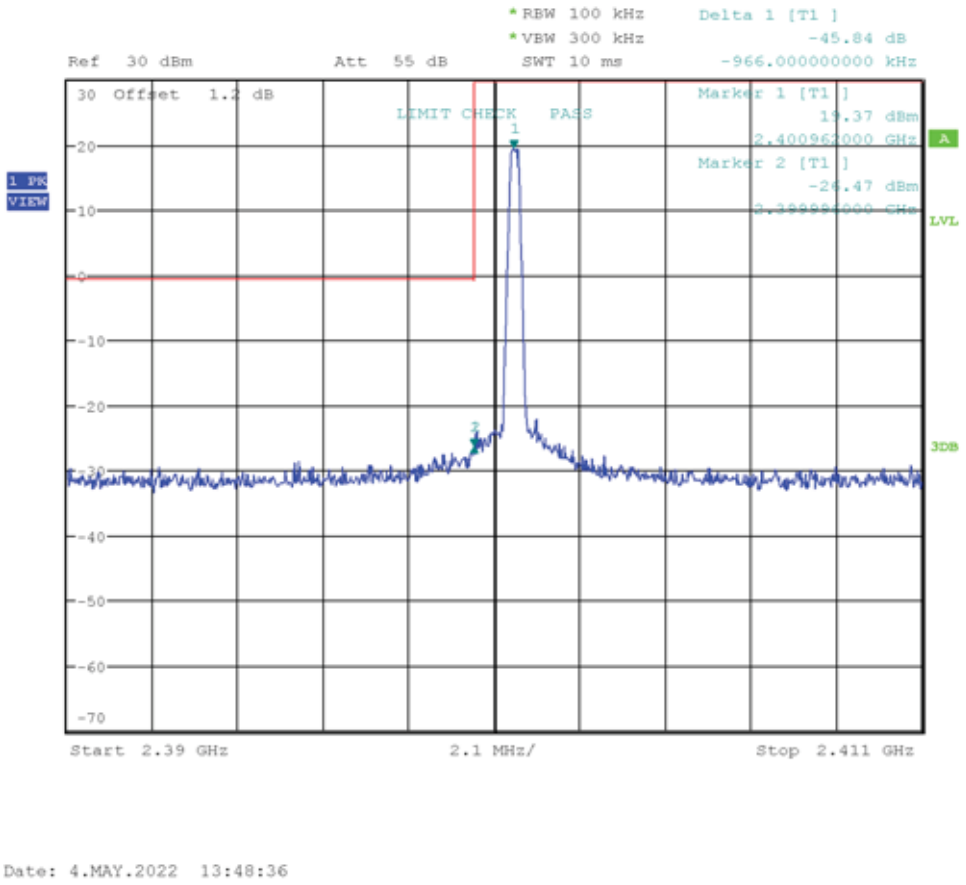
Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operational Mode:	GFSK, Hopping
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Band-edge	Upper
In-band Frequency [MHz]:	2476.348
Max. in-band Level [dBm/100 kHz]:	19.831
Out-of-band Frequency [MHz]:	2490.267
Max. out-of-band Level [dBm/100 kHz]:	-43.811
Attenuation [dB]:	-63.64



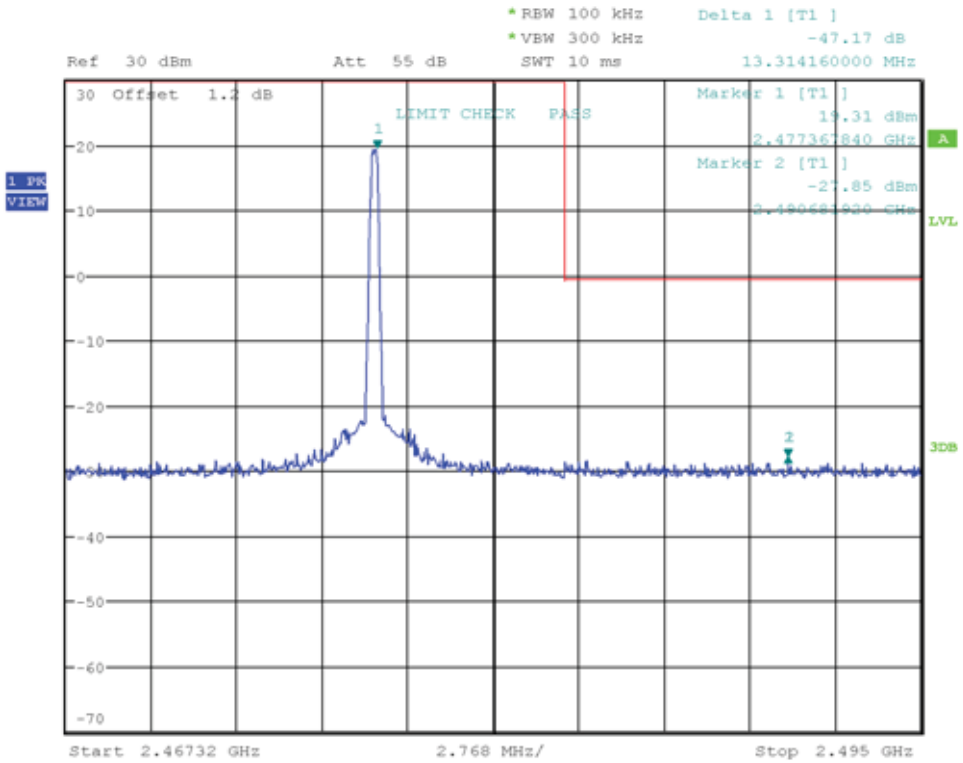
Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operational Mode:	GFSK, Channel: 1, 2401 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Band-edge	Lower
In-band Frequency [MHz]:	2400.962
Max. in-band Level [dBm/100 kHz]:	19.372
Out-of-band Frequency [MHz]:	2399.996
Max. out-of-band Level [dBm/100 kHz]:	-26.473
Attenuation [dB]:	-45.84



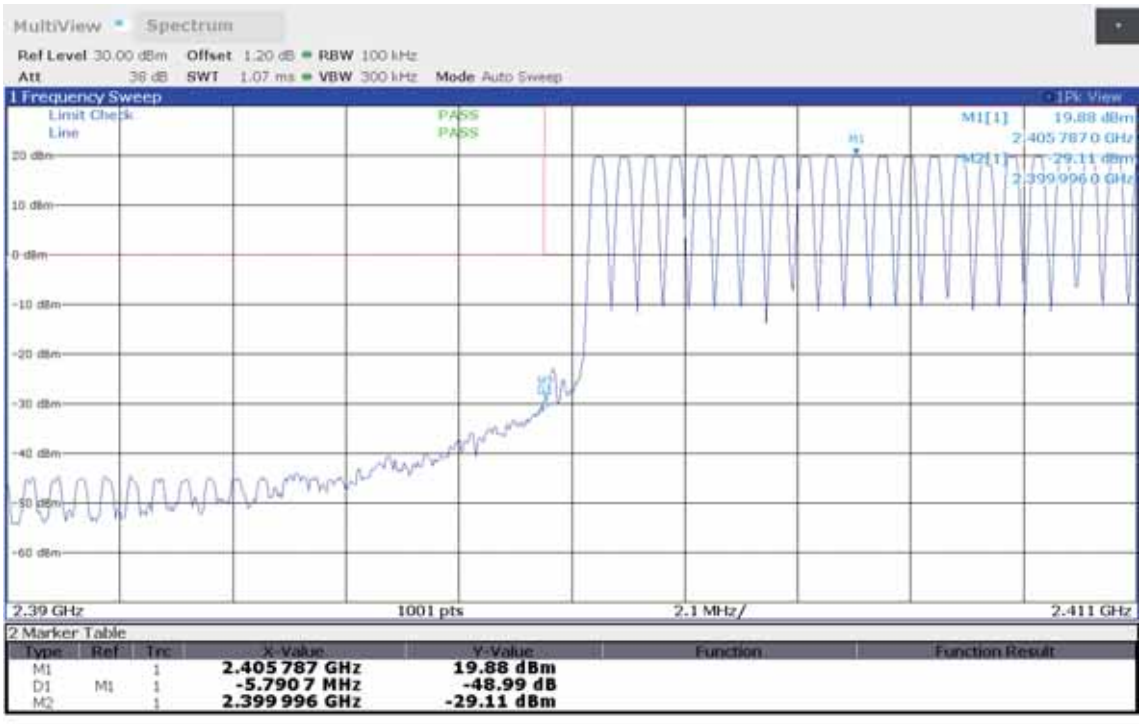
Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operational Mode:	GFSK, Channel: 160, 2477.32 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Band-edge	Upper
In-band Frequency [MHz]:	2477.368
Max. in-band Level [dBm/100 kHz]:	19.314
Out-of-band Frequency [MHz]:	2490.682
Max. out-of-band Level [dBm/100 kHz]:	-27.852
Attenuation [dB]:	-47.17



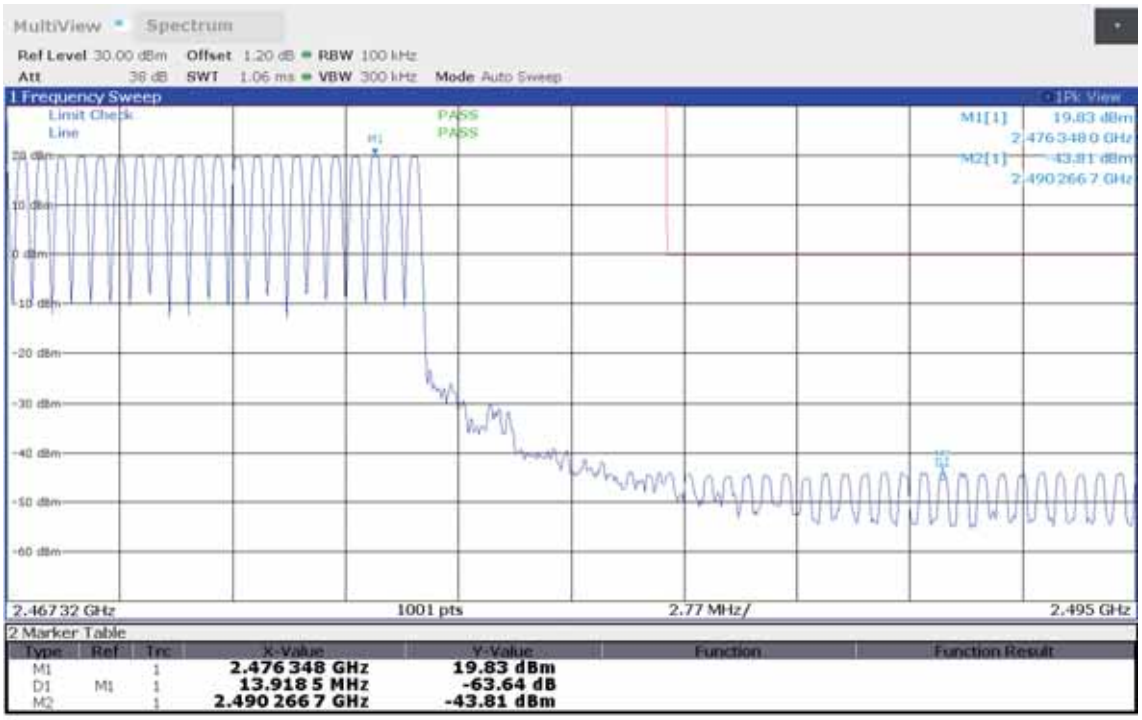
Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operational Mode:	GFSK, Hopping
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Band-edge	Lower
In-band Frequency [MHz]:	2405.787
Max. in-band Level [dBm/100 kHz]:	19.878
Out-of-band Frequency [MHz]:	2399.996
Max. out-of-band Level [dBm/100 kHz]:	-29.113
Attenuation [dB]:	-48.99



Emissions in nonrestricted frequency bands at the Band-edge

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operational Mode:	GFSK, Hopping
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Band-edge	Upper
In-band Frequency [MHz]:	2476.348
Max. in-band Level [dBm/100 kHz]:	19.831
Out-of-band Frequency [MHz]:	2490.267
Max. out-of-band Level [dBm/100 kHz]:	-43.811
Attenuation [dB]:	-63.64



3.9 Test Conditions and Results - Conducted spurious emissions

3.9.1 Information

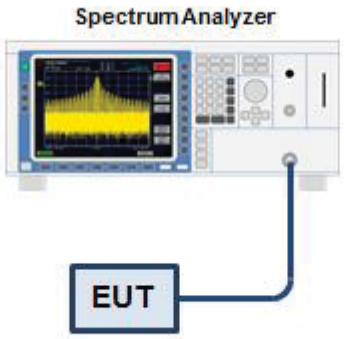
Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Uncertainty	± 4.25 dB
Measurement Method	ANSI C63.10 6.10
Operator	Wilfried Treffke
Date	2022-04-12

3.9.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.9.3 Setup

Test Setup



3.9.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSW 43	EF00896	2021-07	2022-07
Cable (diverse)	– (diverse)	CAABI	EF00779	2022-02	2023-02

3.9.5 Procedure

Test Procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels outside frequency band

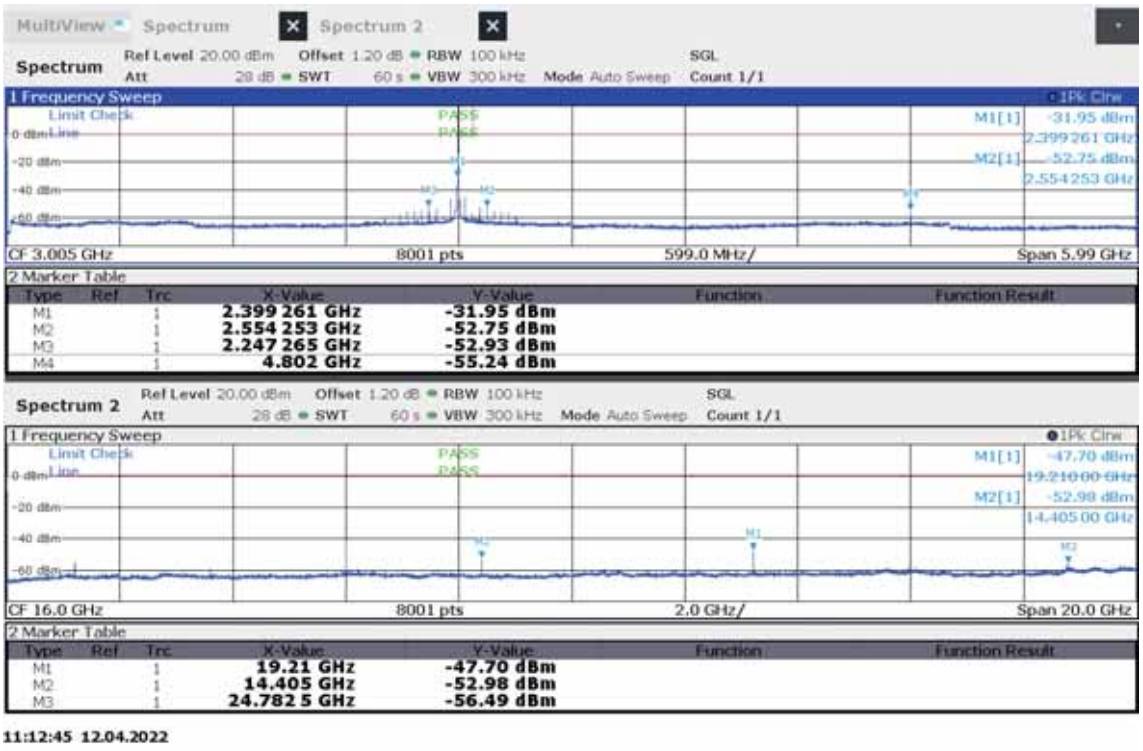
3.9.6 Results

Test Results – EUT 7.2 (ID 39318)		
Mode	Channel [MHz]	Verdict
GFSK	2401.00	PASS
GFSK	2438.92	PASS
GFSK	2477.32	PASS

Test Results – EUT 3.2 (ID 39314)		
Mode	Channel [MHz]	Verdict
GFSK	2401.00	PASS
GFSK	2438.92	PASS
GFSK	2477.32	PASS

Conducted Spurious Emissions

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.8
Operational Mode:	GFSK, Channel: 1, 2401 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Max. in-band Frequency [MHz]:	2400.9
Max. in-band Level [dBm/100 kHz]:	19.7
Out-of-band Limit [dBm/100 kHz]:	-0.3

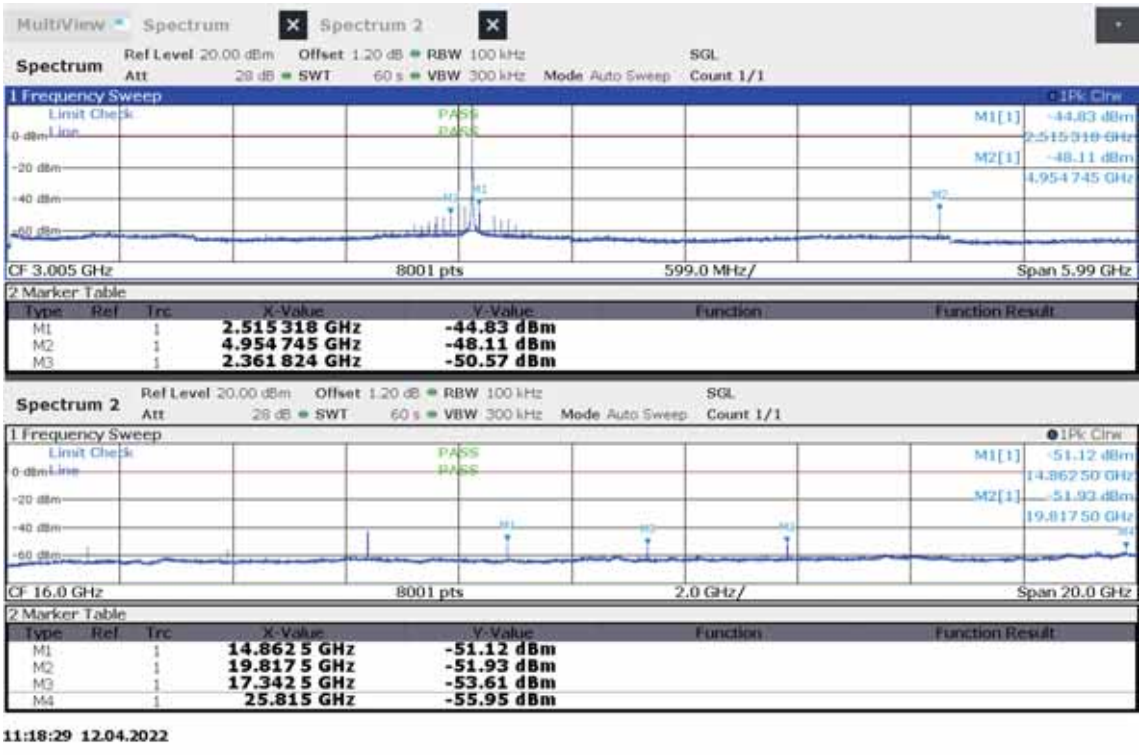


Conducted Spurious Emissions

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.8
Operational Mode:	GFSK, Channel: 80, 2438.92 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Max. in-band Frequency [MHz]:	2438.9
Max. in-band Level [dBm/100 kHz]:	19.5
Out-of-band Limit [dBm/100 kHz]:	-0.5

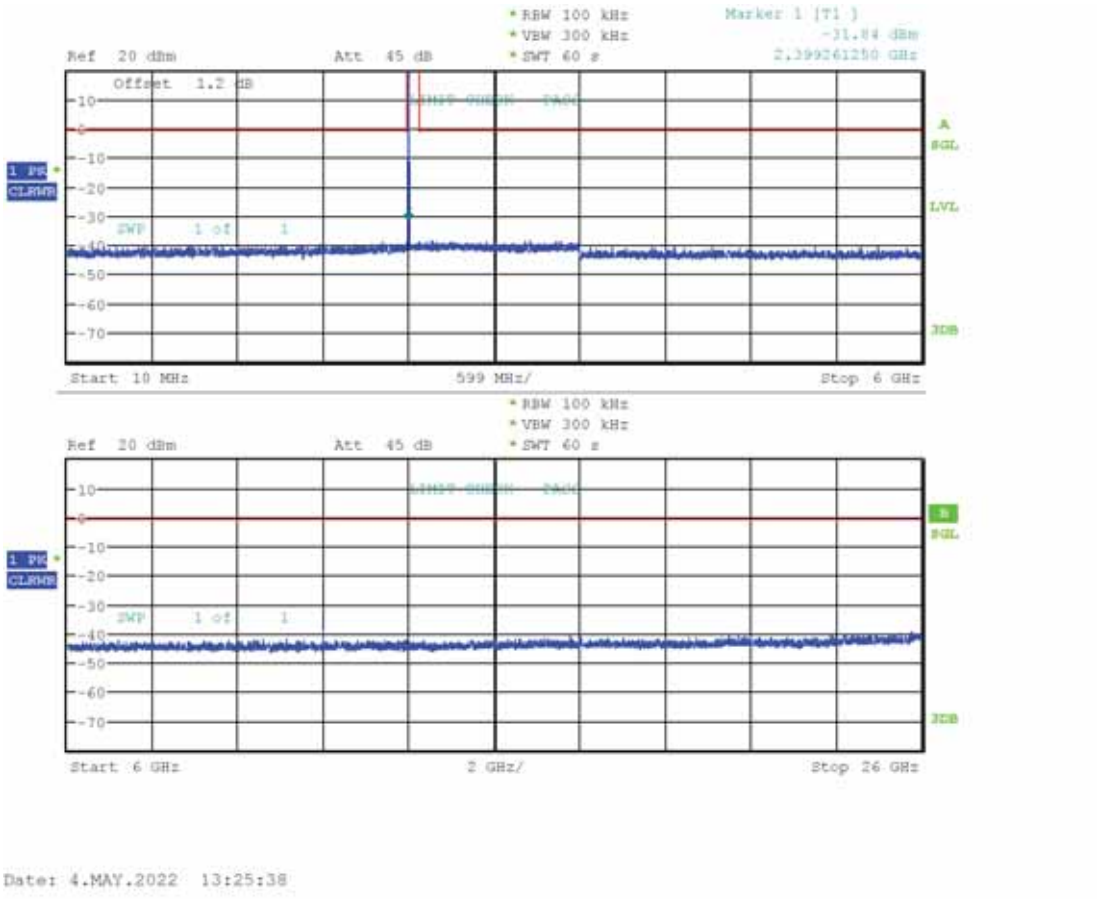
Conducted Spurious Emissions

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.8
Operational Mode:	GFSK, Channel: 160, 2477.32 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-04-12
Max. in-band Frequency [MHz]:	2477.3
Max. in-band Level [dBm/100 kHz]:	19.6
Out-of-band Limit [dBm/100 kHz]:	-0.4



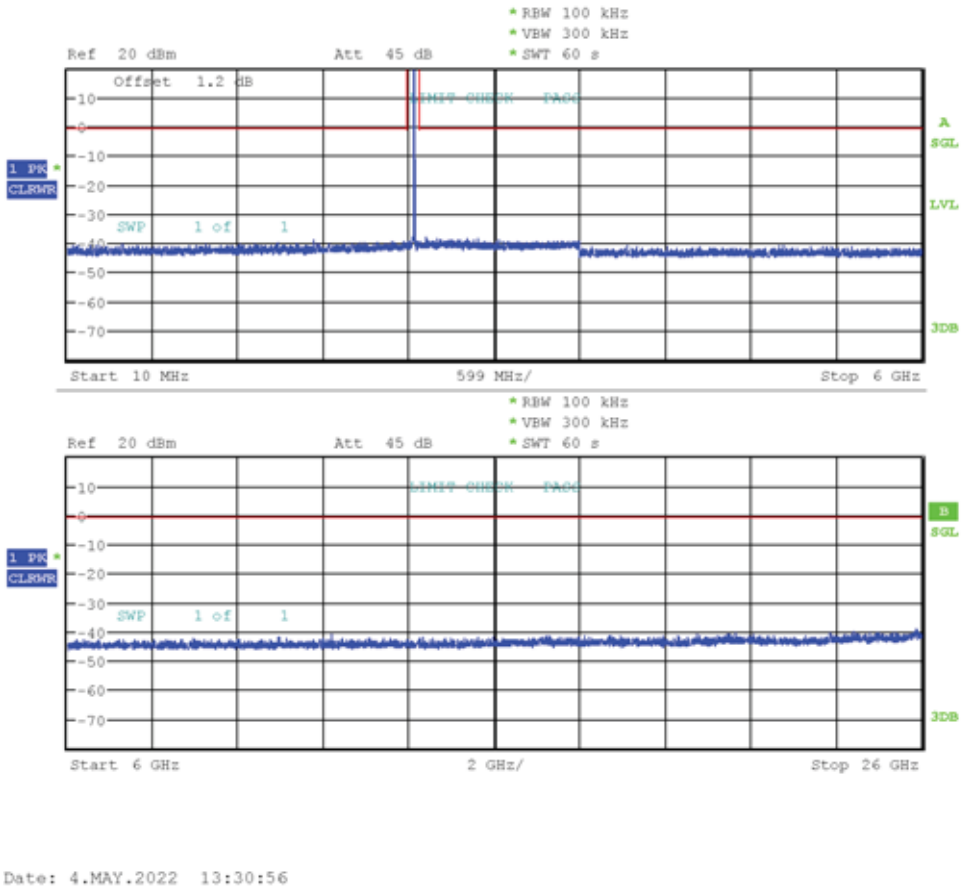
Conducted Spurious Emissions

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.8
Operational Mode:	GFSK, Channel: 1, 2401 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Max. in-band Frequency [MHz]:	2400.9
Max. in-band Level [dBm/100 kHz]:	19.1
Out-of-band Limit [dBm/100 kHz]:	-0.9



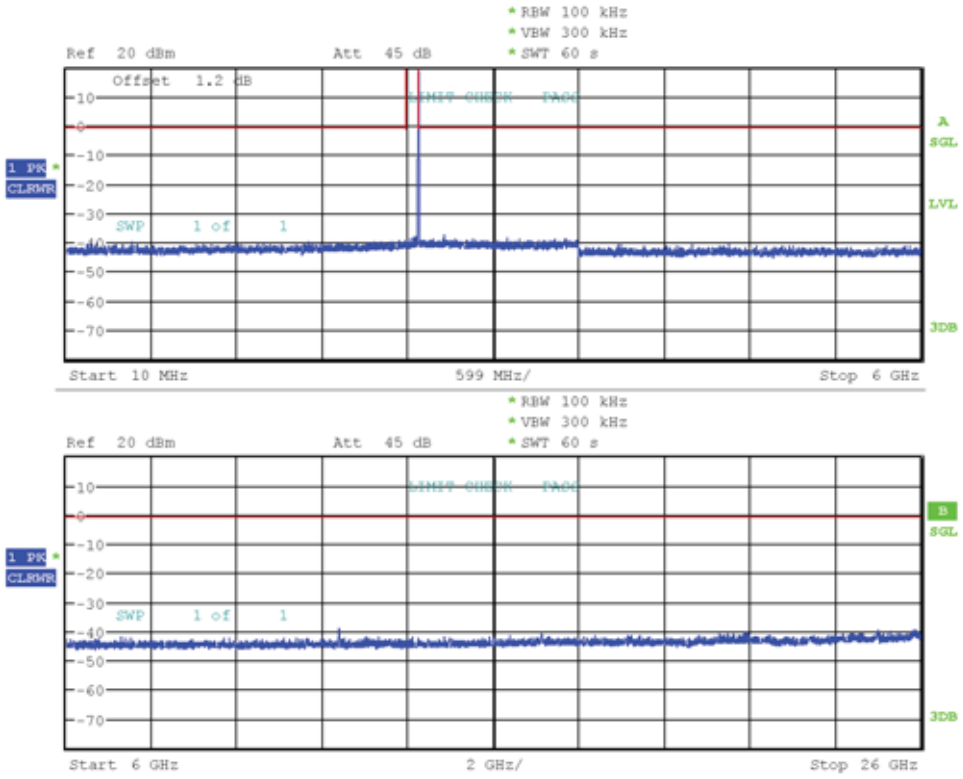
Conducted Spurious Emissions

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.8
Operational Mode:	GFSK, Channel: 80, 2438.92 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Max. in-band Frequency [MHz]:	2438.9
Max. in-band Level [dBm/100 kHz]:	19.2
Out-of-band Limit [dBm/100 kHz]:	-0.8



Conducted Spurious Emissions

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242 (#3.2)
Test Sample ID:	39314
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.8
Operational Mode:	GFSK, Channel: 160, 2477.32 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Thuy Anh Hoang
Test Site:	Eurofins Product Service GmbH
Test Date:	2022-05-04
Max. in-band Frequency [MHz]:	2477.3
Max. in-band Level [dBm/100 kHz]:	19.0
Out-of-band Limit [dBm/100 kHz]:	-1.0



Date: 4.MAY.2022 13:21:12

3.10 Test Conditions and Results - Transmitter radiated emissions

3.10.1 Information

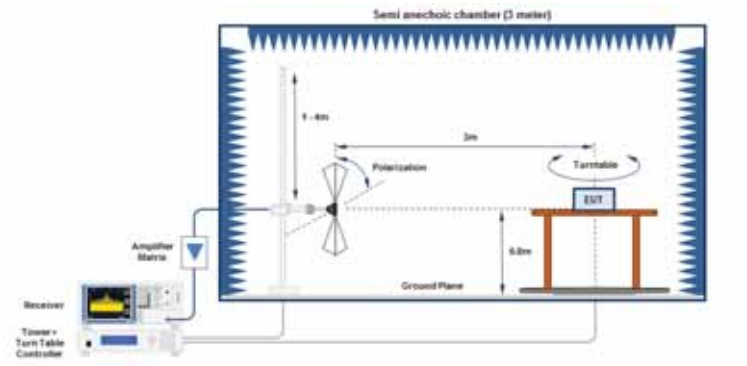
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209; ISED RSS-Gen, Issue 5 A2 (section 6.13)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6; KDB Publication 558074 D01 v05r01
Operator	Wilfried Treffke
Date	2022-03-31

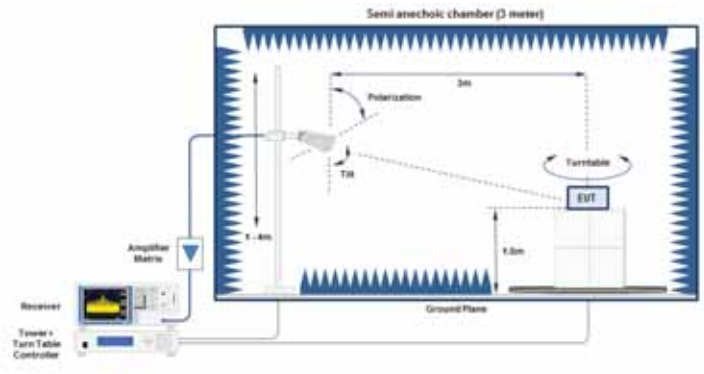
3.10.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [µV/m]	Measurement distance [m]
0.009 - 0.09	Average	2400/F[kHz]	300
0.09 - 0.110	Quasi-Peak	2400/F[kHz]	300
0.110 - 0.490	Average	2400/F[kHz]	300
0.490 - 1.705	Quasi-Peak	24000/F[kHz]	30
1.705 - 30.0	Quasi-Peak	30	30
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.10.3 Setup

Test Setup 30 MHz - 1000 MHz



Test Setup > 1 GHz


3.10.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2022-07
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC2	EF00200	---	---
Spectrum Analyzer	R&S	FSU 43	EF01631	2021-07	2022-07
Antenna	Schwarzbeck	BBHA 9120B	EF01678	2021-03	2022-03
Antenna	Amplifier Research	AT4560	EF00302	2021-06	2023-06

3.10.5 Procedure

Test Procedure 30 MHz - 1000 MHz
1. EUT is placed on a non-conducting support at the centre of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using a peak detector. 6. Then the operational duty cycle of the EUT is subtracted from the Peak reading to derive the RMS average value.

3.10.6 Results

Test Results - Dipol coaxial antenna AA050031						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2401.00	2362.6	59.66	pk	ver	74.00	-14.34
2401.00	2362.6	49.66	avg	ver	54.00	-04.34
2401.00	12005	59.73	pk	hor	74.00	-14.27
2401.00	12005	49.73	avg	hor	74.00	-04.27
2401.00	19207	54.85	pk	hor	74.00	-19.15
2401.00	19207	44.85	avg	hor	54.00	-09.15
2438.92	131.4347	24.40	pk	ver	43.50	-19.09
2438.92	19513	57.60	pk	hor	74.00	-16.40
2438.92	19513	47.60	avg	hor	54.00	-06.40
2438.92	2285.3	44.49	pk	ver	74.00	-29.51
2438.92	2285.3	34.49	avg	ver	54.00	-19.51
2438.92	2323.7	45.44	pk	ver	74.00	-28.56
2438.92	2323.7	35.44	avg	ver	54.00	-18.56
2438.92	4878.1	48.68	pk	ver	74.00	-25.32
2438.92	4878.1	38.68	avg	ver	54.00	-15.32
2438.92	7317.1	51.29	pk	hor	74.00	-22.71
2438.92	7317.1	41.29	avg	hor	54.00	-12.71
2477.32	114.5622	23.60	pk	ver	43.50	-19.87
2477.32	122.0295	23.80	pk	ver	43.50	-19.67
2477.32	2483.5	60.96	pk	ver	74.00	-13.04
2477.32	2483.5	50.96	avg	ver	54.00	-03.04
2477.32	2484.6	61.83	pk	ver	74.00	-12.17
2477.32	2484.6	48.14	avg	ver	54.00	-05.86
2477.32	19819	53.80	pk	hor	74.00	-20.20
2477.32	19819	43.80	avg	hor	54.00	-10.20
2477.32	22296	54.04	pk	hor	74.00	-19.96
2477.32	22296	44.04	avg	hor	54.00	-09.96
2477.32	2362	47.04	pk	ver	74.00	-26.96
2477.32	2362	37.04	avg	ver	54.00	-16.96
2477.32	2669	46.02	pk	ver	74.00	-27.98
2477.32	2669	36.02	avg	ver	54.00	-17.98
2477.32	4955	49.19	pk	ver	74.00	-24.81
2477.32	4955	39.19	avg	ver	54.00	-14.81
2477.32	7432	48.52	pk	hor	74.00	-25.48
2477.32	7432	38.52	avg	hor	54.00	-15.48
Comments:	AV value is calculated from peak value by duty cycle correction of -10.0 dB					

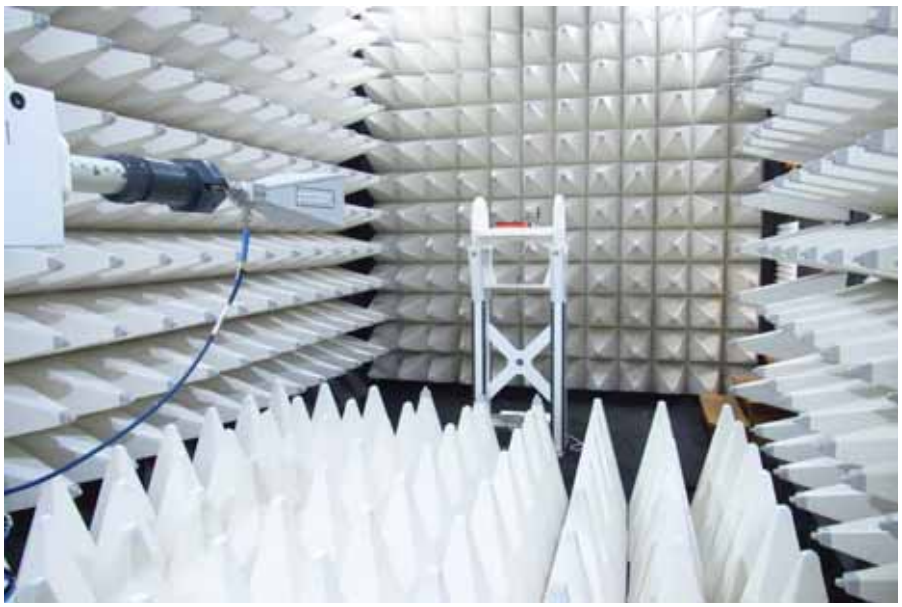
Test Results - Antenna AA030018 (Sleeve dipole)						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2401.00	4800	48.28	pk	ver	74.00	-25.72
2401.00	4800	38.28	avg	ver	54.00	-15.72
2401.00	12005	63.46	pk	hor	74.00	-10.54
2401.00	12005	53.46	avg	hor	54.00	-00.54
2401.00	18493	48.50	pk	hor	74.00	-25.50
2401.00	18493	38.50	avg	hor	54.00	-15.50
2401.00	2370.4	58.54	pk	ver	74.00	-15.46
2401.00	2370.4	48.54	avg	ver	54.00	-05.46
2438.92	2248.8	44.53	pk	ver	74.00	-29.47
2438.92	2248.8	34.53	avg	ver	54.00	-19.47
2438.92	4872	53.11	pk	ver	74.00	-20.89
2438.92	4872	43.11	avg	ver	54.00	-10.89
2438.92	7320	52.27	pk	hor	74.00	-21.73
2438.92	7320	42.27	avg	hor	54.00	-11.73
2438.92	12195	65.12	pk	hor	74.00	-18.88
2438.92	12195	65.12	avg	hor	74.00	-08.88
2438.92	19511	56.50	pk	ver	74.00	-17.50
2438.92	19511	46.50	avg	ver	54.00	-07.50
2477.32	4952	51.49	pk	ver	74.00	-22.51
2477.32	4952	41.49	avg	ver	54.00	-12.51
2477.32	7432	49.47	pk	ver	74.00	-24.53
2477.32	7432	39.47	avg	ver	54.00	-14.53
2477.32	12387	59.12	pk	hor	74.00	-14.88
2477.32	12387	49.12	avg	hor	54.00	-04.88
2477.32	19818	55.51	pk	hor	74.00	-18.49
2477.32	19818	45.51	avg	hor	54.00	-08.49
2477.32	22296	56.25	pk	hor	74.00	-17.75
2477.32	22296	46.25	avg	hor	54.00	-07.75
2477.32	2484.7	60.49	pk	ver	74.00	-13.51
2477.32	2484.7	50.49	avg	ver	54.00	-03.51

Test Results - Antenna AA080004 (Monopole 35mm)						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2401.00	4800	59.31	pk	ver	74.00	-14.69
2401.00	4800	49.31	pk	ver	54.00	-04.69
2401.00	12005	64.22	pk	hor	74.00	-19.78
2401.00	12005	54.22	pk	hor	54.00	-09.78
2401.00	19208	44.40	pk	ver	74.00	-19.60
2401.00	19208	34.40	pk	ver	54.00	-09.60
2438.92	4872	55.48	pk	hor	74.00	-18.52
2438.92	4872	45.48	pk	hor	54.00	-08.52
2438.92	7320	54.66	pk	ver	74.00	-19.34
2438.92	7320	44.66	pk	ver	54.00	-09.34
2438.92	12194	44.08	pk	hor	74.00	-19.92
2438.92	12194	34.08	pk	hor	54.00	-09.92
2438.92	19512	56.40	pk	ver	74.00	-17.60
2438.92	19512	46.40	pk	ver	54.00	-07.60
2477.32	2364	46.98	pk	ver	74.00	-27.02
2477.32	2364	36.98	pk	ver	54.00	-17.02
2477.32	4952	54.62	pk	ver	74.00	-19.38
2477.32	4952	44.62	pk	ver	54.00	-09.38
2477.32	7432	51.72	pk	hor	74.00	-22.28
2477.32	7432	41.72	pk	hor	54.00	-12.28
2477.32	12387	62.35	pk	ver	74.00	-11.65
2477.32	12387	52.35	pk	ver	54.00	-01.65
2477.32	22296	57.48	pk	ver	74.00	-16.52
2477.32	22296	47.48	pk	ver	54.00	-06.52
2477.32	2483.5	61.74	pk	ver	74.00	-12.26
2477.32	2483.5	51.74	pk	ver	54.00	-02.26
2477.32	2486.6	60.36	pk	ver	74.00	-13.64
2477.32	2486.6	50.36	pk	ver	54.00	-03.64

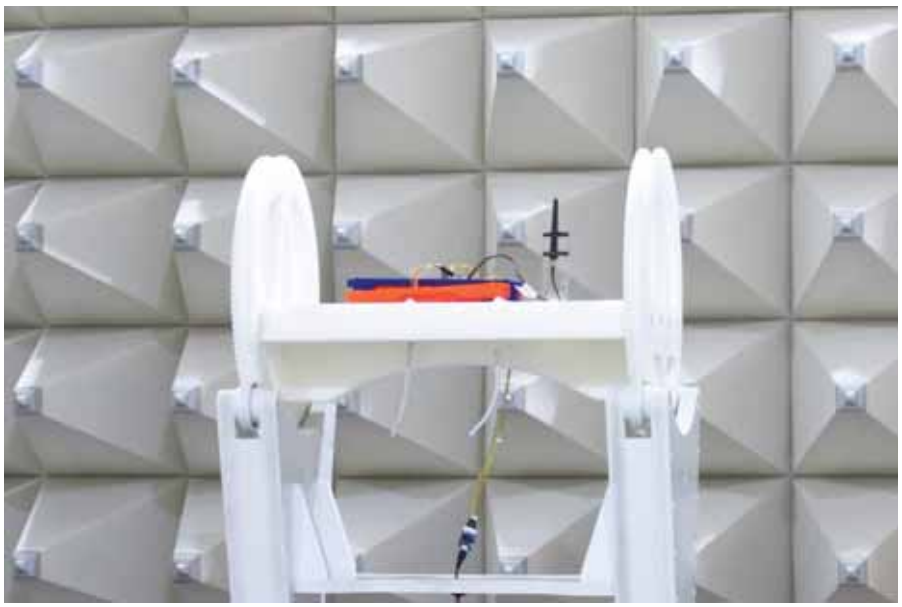
Test Results - Onboard antenna (Inverted-F)						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2401.00	4800	57.84	pk	ver	74.00	-16.16
2401.00	4800	47.84	pk	ver	54.00	-06.16
2401.00	12005	56.71	pk	hor	74.00	-17.29
2401.00	12005	46.71	pk	hor	54.00	-07.29
2401.00	20448	48.55	pk	ver	74.00	-25.45
2401.00	20448	38.55	pk	ver	54.00	-15.45
2401.00	2362.6	59.41	pk	hor	74.00	-14.59
2401.00	2362.6	47.38	avg	hor	54.00	-06.62
2438.92	4872	59.41	pk	ver	74.00	-14.59
2438.92	4872	49.41	pk	ver	54.00	-04.59
2438.92	7320	56.73	pk	ver	74.00	-17.27
2438.92	7320	46.73	pk	ver	54.00	-07.27
2438.92	12195	59.54	pk	hor	54.00	-14.46
2438.92	12195	49.54	pk	hor	54.00	-04.46
2438.92	19511	58.74	pk	hor	74.00	-15.26
2438.92	19511	48.74	pk	hor	54.00	-05.26
2477.32	4952	59.98	pk	hor	74.00	-14.02
2477.32	4952	49.98	pk	hor	54.00	-04.02
2477.32	7432	53.11	pk	hor	74.00	-20.89
2477.32	7432	43.11	pk	hor	54.00	-10.89
2477.32	19819	57.46	pk	hor	74.00	-16.54
2477.32	19819	47.46	pk	hor	54.00	-06.54
2477.32	2483.7	60.14	pk	hor	74.00	-13.86
2477.32	2483.7	50.14	pk	hor	54.00	-13.86
2477.32	2483.7	46.97	avg	hor	54.00	-07.03
2477.32	2487	60.00	pk	hor	74.00	-14.00
2477.32	2487	50.00	pk	hor	54.00	-04.00

3.10.7 Setup Photos

Setup for measurements above 1 GHz with antenna AA030018



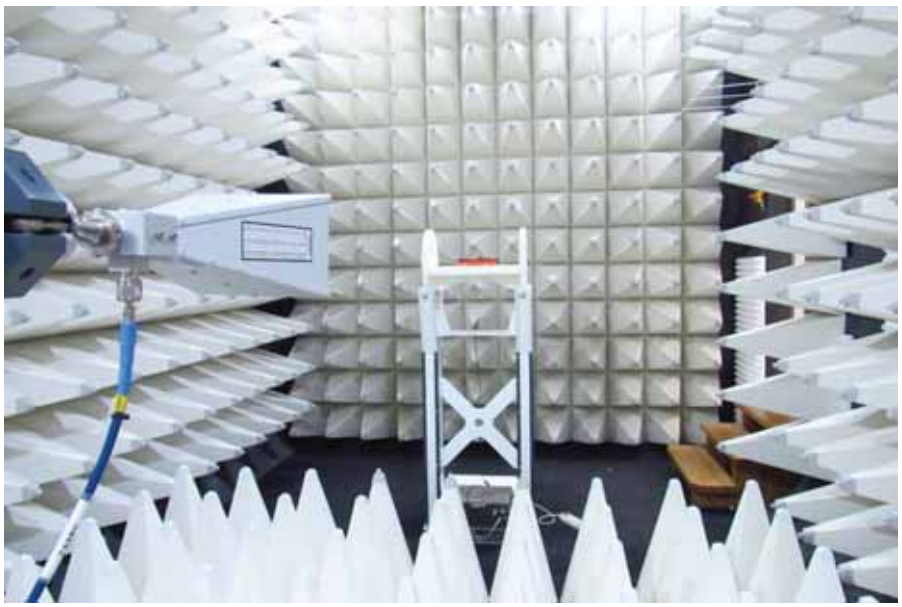
Setup for measurements above 1 GHz with antenna AA030018 (2)



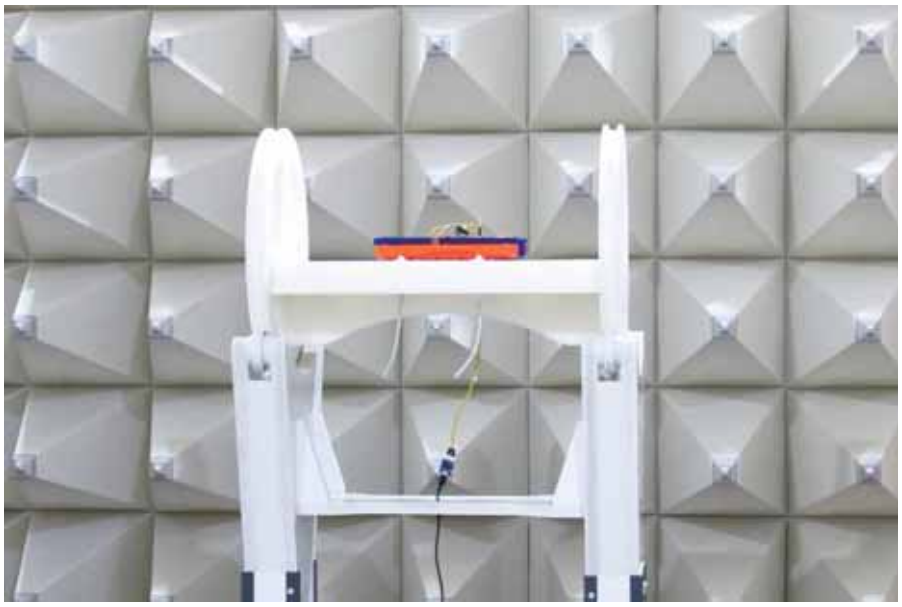
Setup for measurements above 1 GHz with antenna AA050031

Setup for measurements above 1 GHz with antenna AA050031 (2)

Setup for measurements above 1 GHz with antenna AA080004



Setup for measurements above 1 GHz with antenna AA080004 (2)

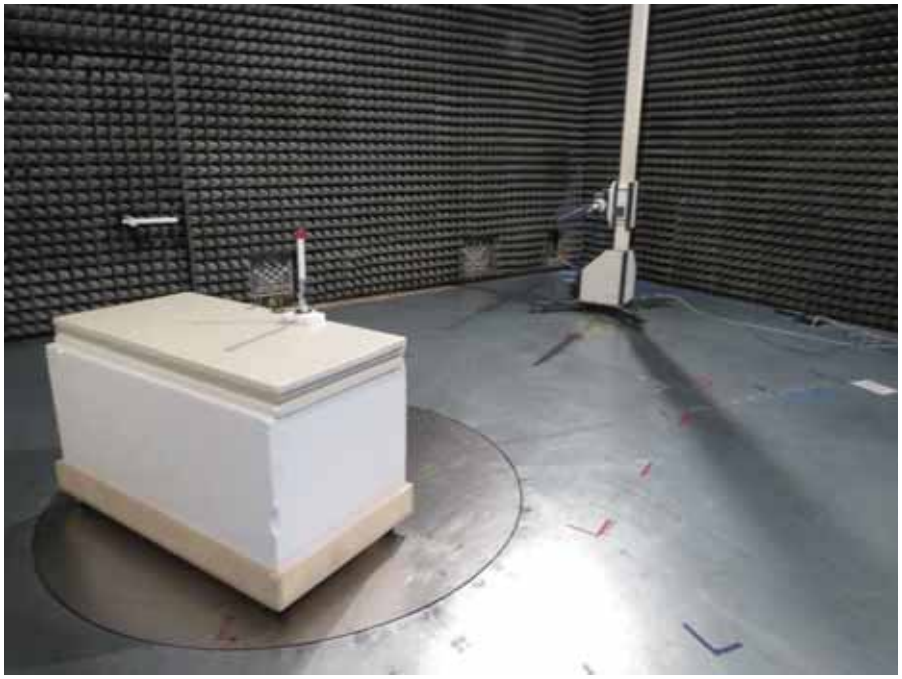


Setup for measurements above 1 GHz with Onboard antenna

Setup for measurements above 1 GHz with Onboard antenna (2)

Test Setup

Setup for measurements below 1 GHz



Setup for measurements below 1 GHz (2)

3.11 Test Conditions and Results - Receiver radiated emissions

3.11.1 Information

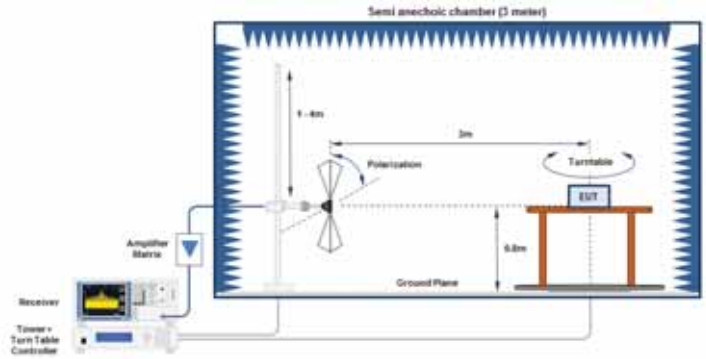
Test Information	
Reference	ISED RSS-247, Issue 2 (section 3.1)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.4-2014 8.1-8.3
Operator	Mr. Qawasmeh
Date	2022-03-30

3.11.2 Limits

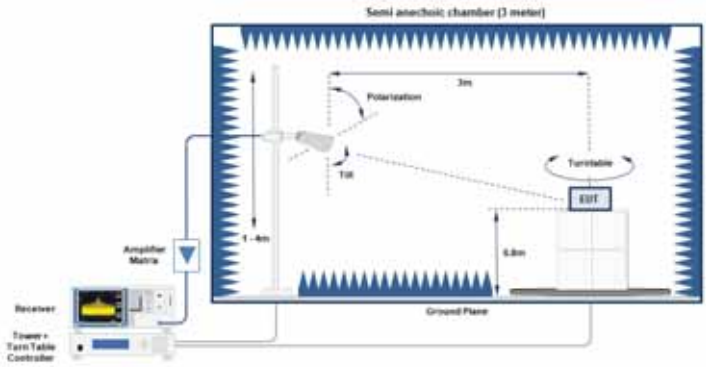
Limits			
Frequency range [MHz]	Detector	Field strength [µV/m]	Measurement distance [m]
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.11.3 Setup

Test Setup 30 MHz - 1000 MHz



Test Setup > 1 GHz



3.11.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2022-07
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC2	EF00200	---	---
Spectrum Analyzer	R&S	FSU 43	EF01631	2021-07	2022-07
Antenna	Schwarzbeck	BBHA 9120B	EF01678	2021-03	2022-03
Antenna	Amplifier Research	AT4560	EF00302	2021-06	2023-06

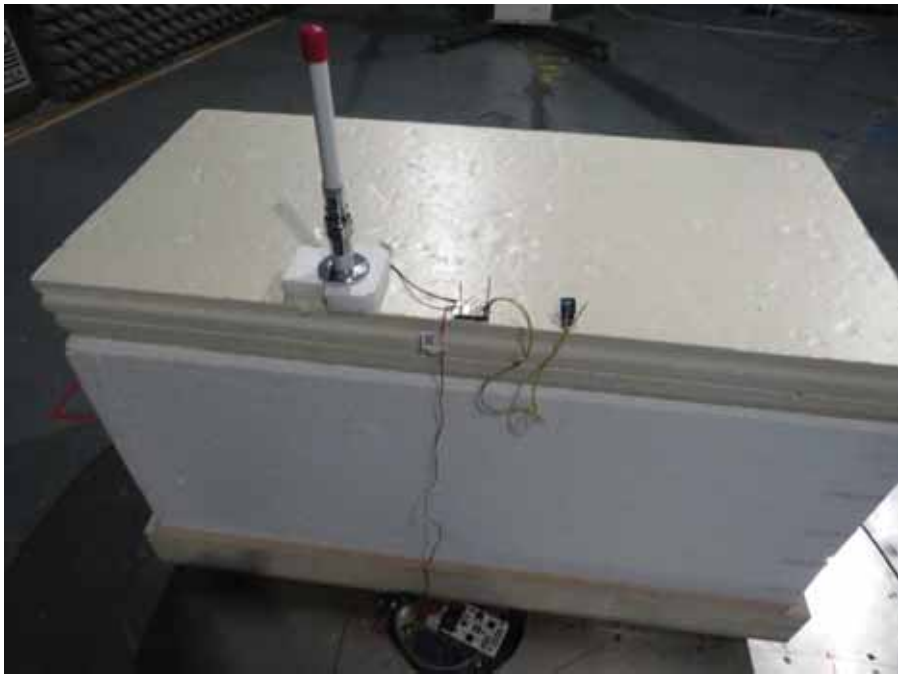
3.11.5 Procedure

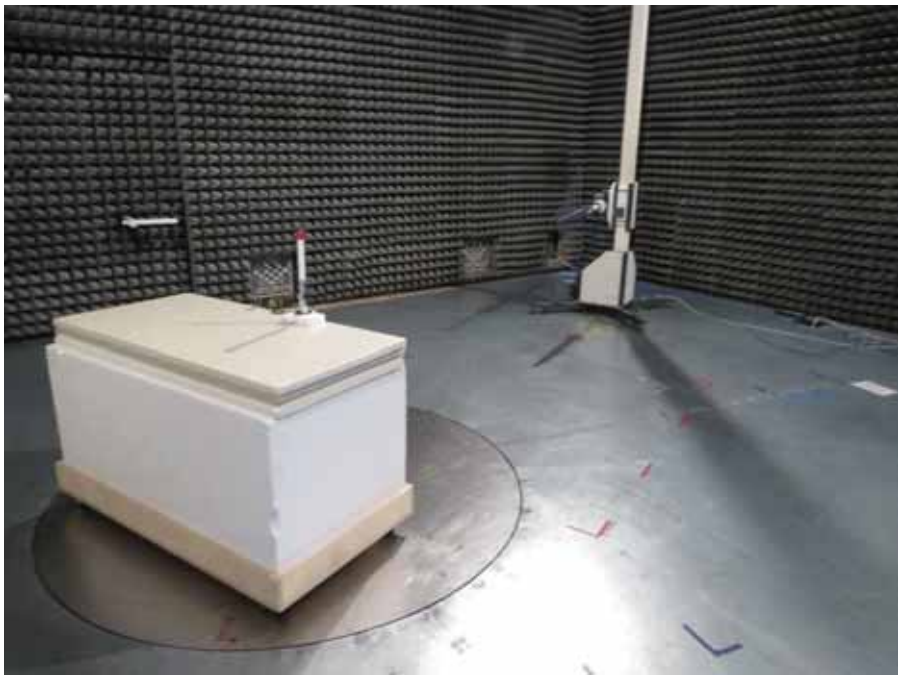
Test Procedure
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground
2. EUT is set to test mode
3. The receiver is set to peak detection with max hold
4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5. All significant emissions are measured again using the corresponding final detector

3.11.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2438.92	121.5917	26.70	pk	ver	43.50	-16.83
	156.4843	25.80	pk	ver	43.50	-17.71
	903.14	29.00	pk	ver	46.00	-17.03
	6483	46.87	pk	ver	74.00	-27.13
	6483	40.00	avg	ver	53.98	-13.98
	17844	46.61	pk	ver	74.00	-27.39
	17844	39.33	avg	ver	53.98	-14.65

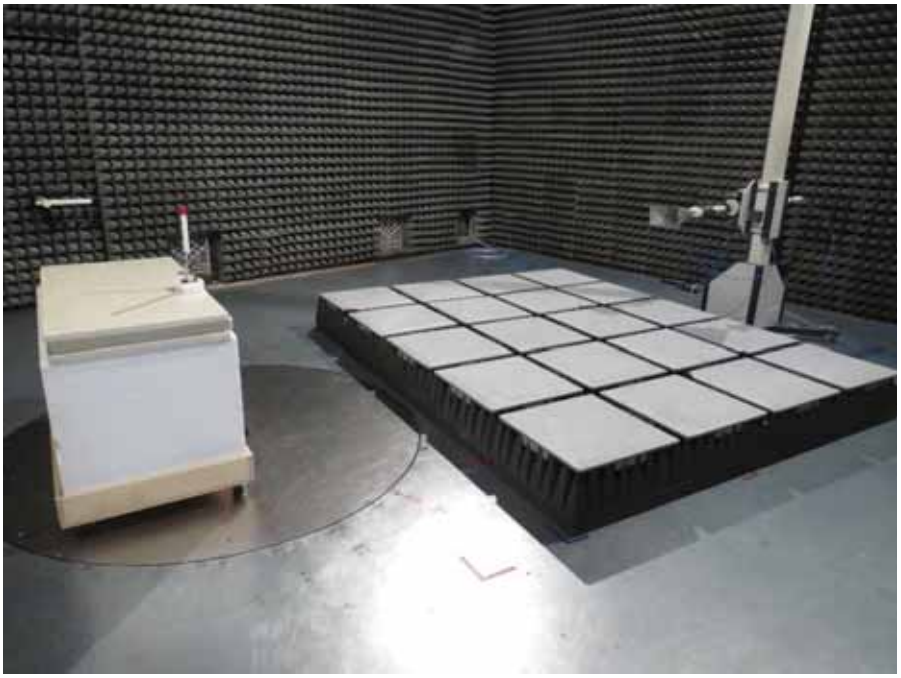
3.11.7 Setup Photos

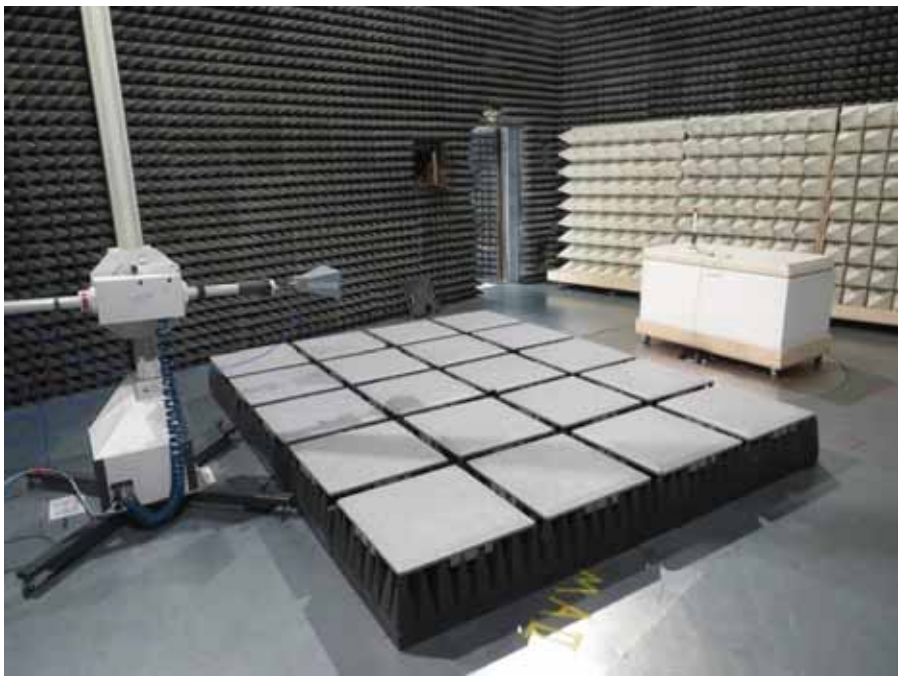
Test Setup


Setup for measurements below 1 GHz


Setup for measurements below 1 GHz (2)

Setup for measurements above 1 GHz

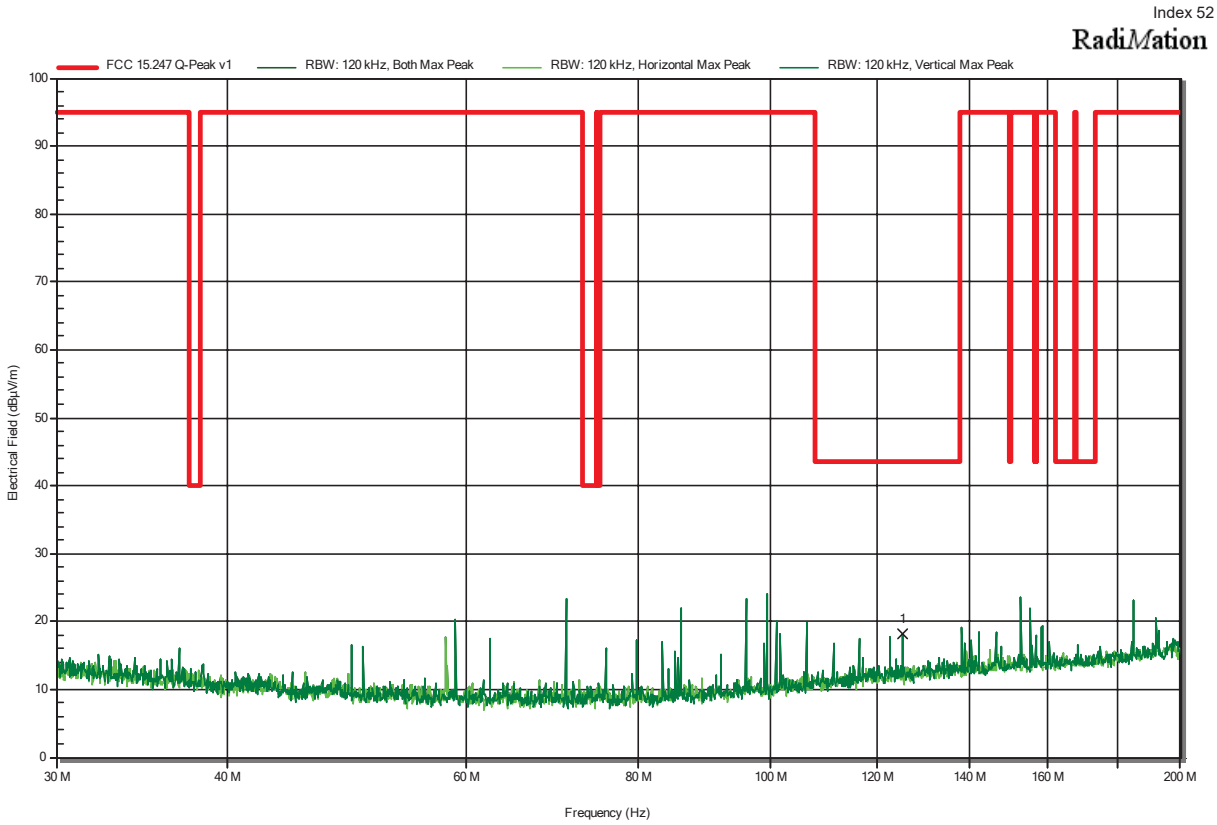


Setup for measurements above 1 GHz (2)


ANNEX A Transmitter spurious emissions

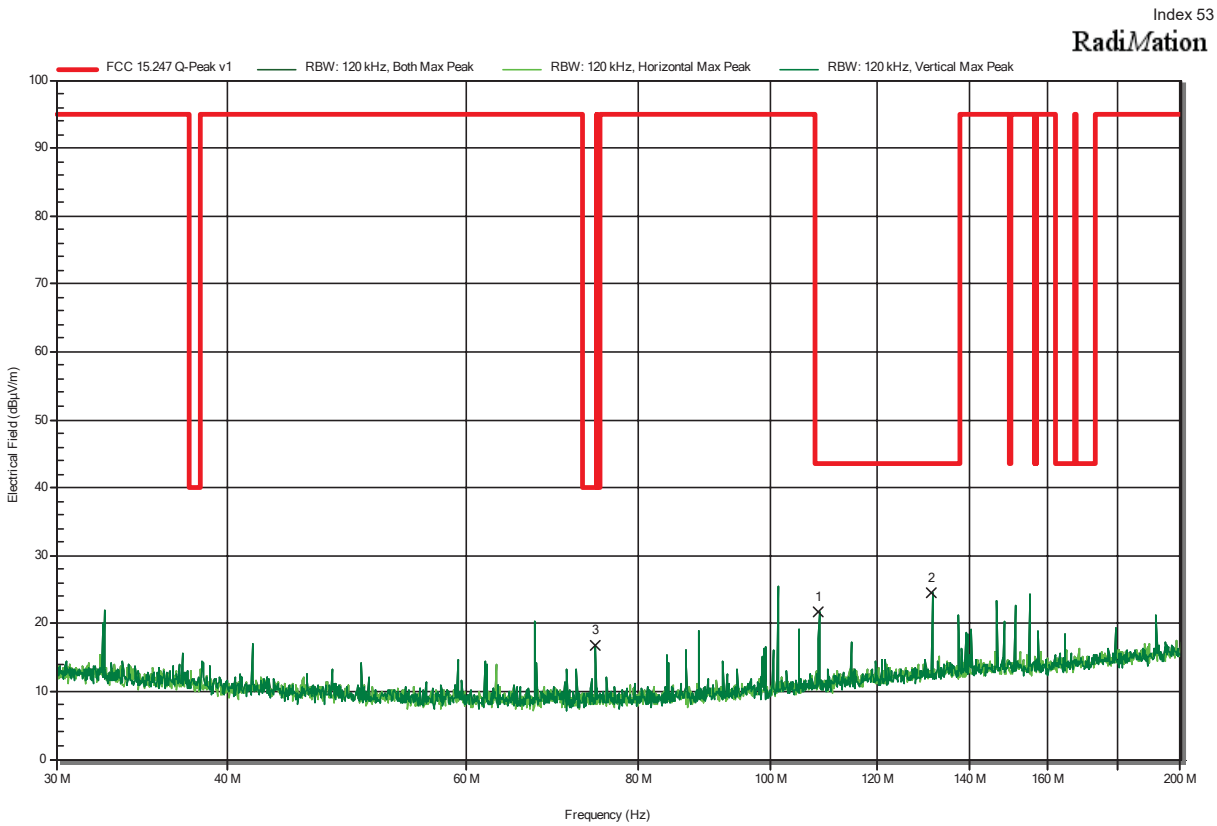
Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HK 116
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Test Date:	2022-03-30
Note:	



Radiated Spurious Emissions according to FCC 15.247

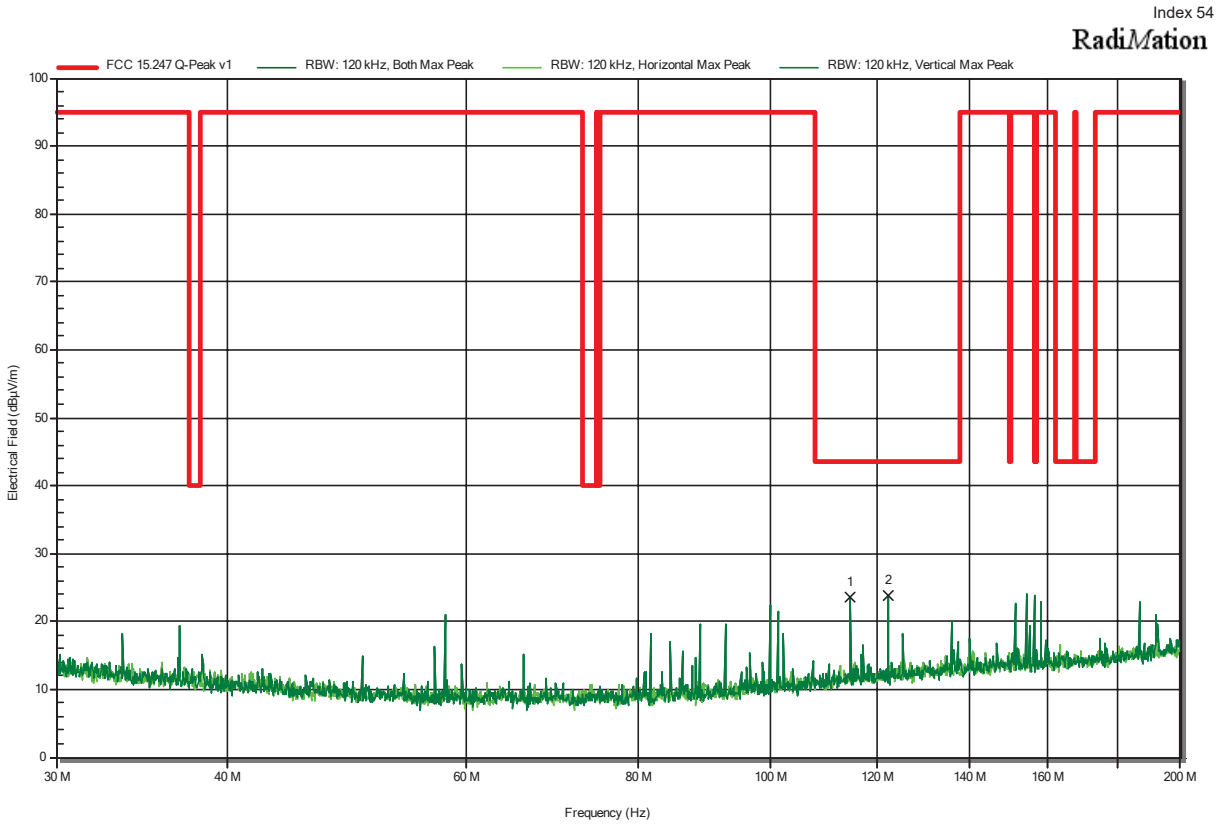
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HK 116
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Test Date:	2022-03-30
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
131.4347 MHz	24.4 dBµV/m	43.5 dBµV/m	-19.09 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

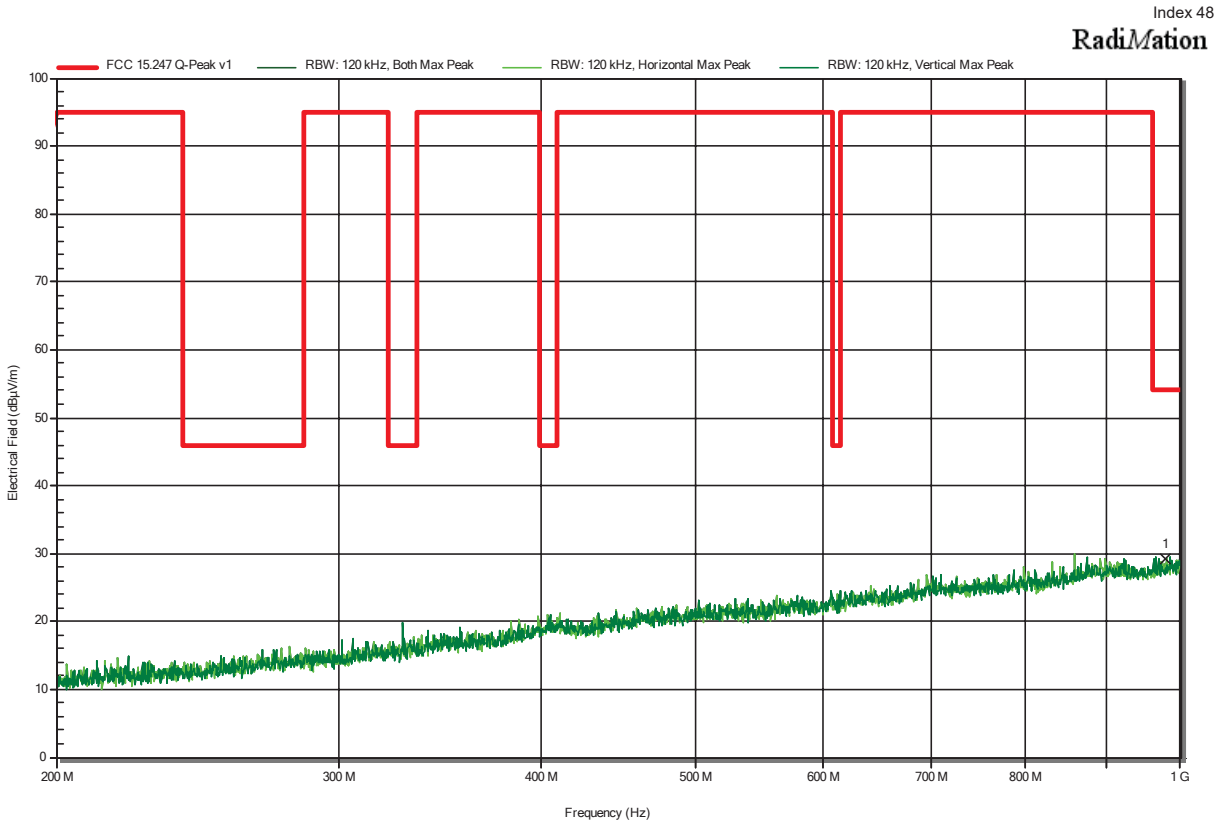
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HK 116
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Test Date:	2022-03-30
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
114.5622 MHz	23.6 dBµV/m	43.5 dBµV/m	-19.87 dB	Pass	Vertical
122.0295 MHz	23.8 dBµV/m	43.5 dBµV/m	-19.67 dB	Pass	Vertical

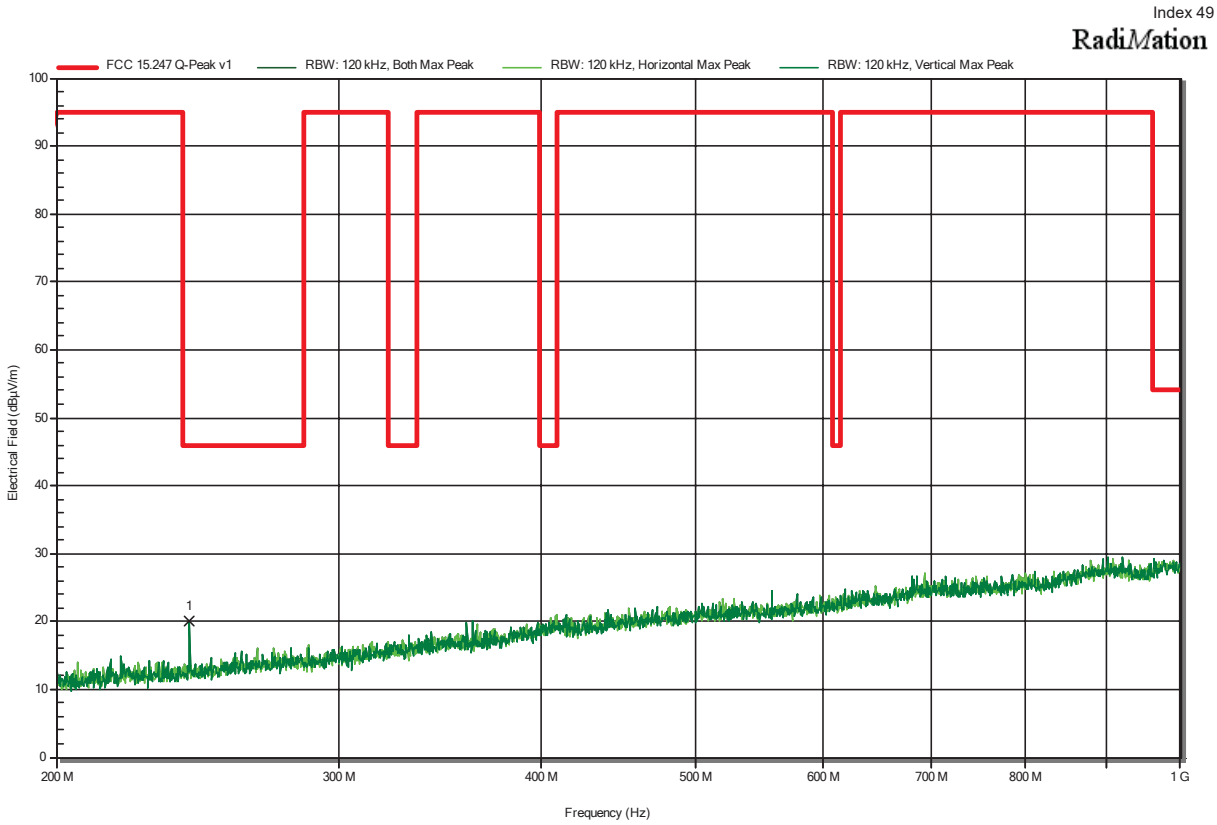
Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HL 223
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Test Date:	2022-03-30
Note:	



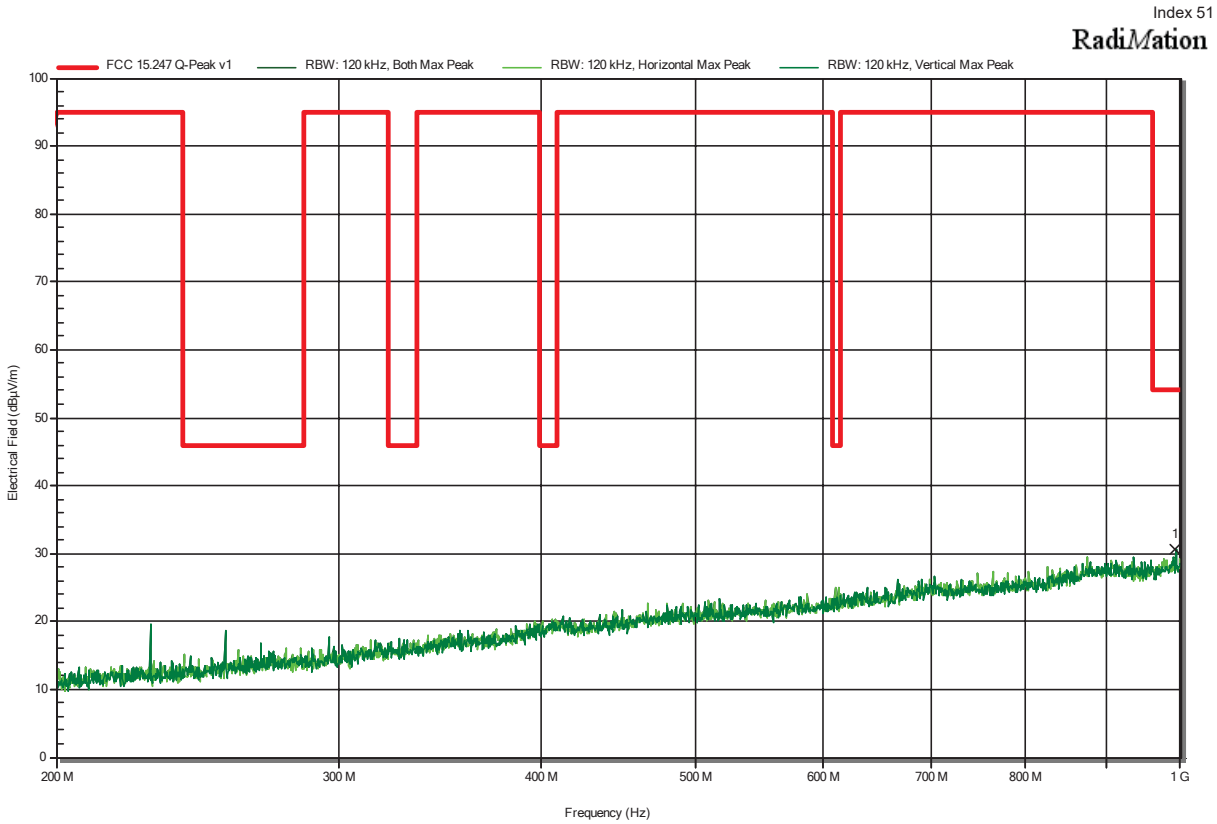
Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HL 223
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Test Date:	2022-03-30
Note:	



Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HL 223
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Test Date:	2022-03-30
Note:	



Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Antenna AA050031i; EUT#7.2
Test Date:	2022-03-29
Note:	

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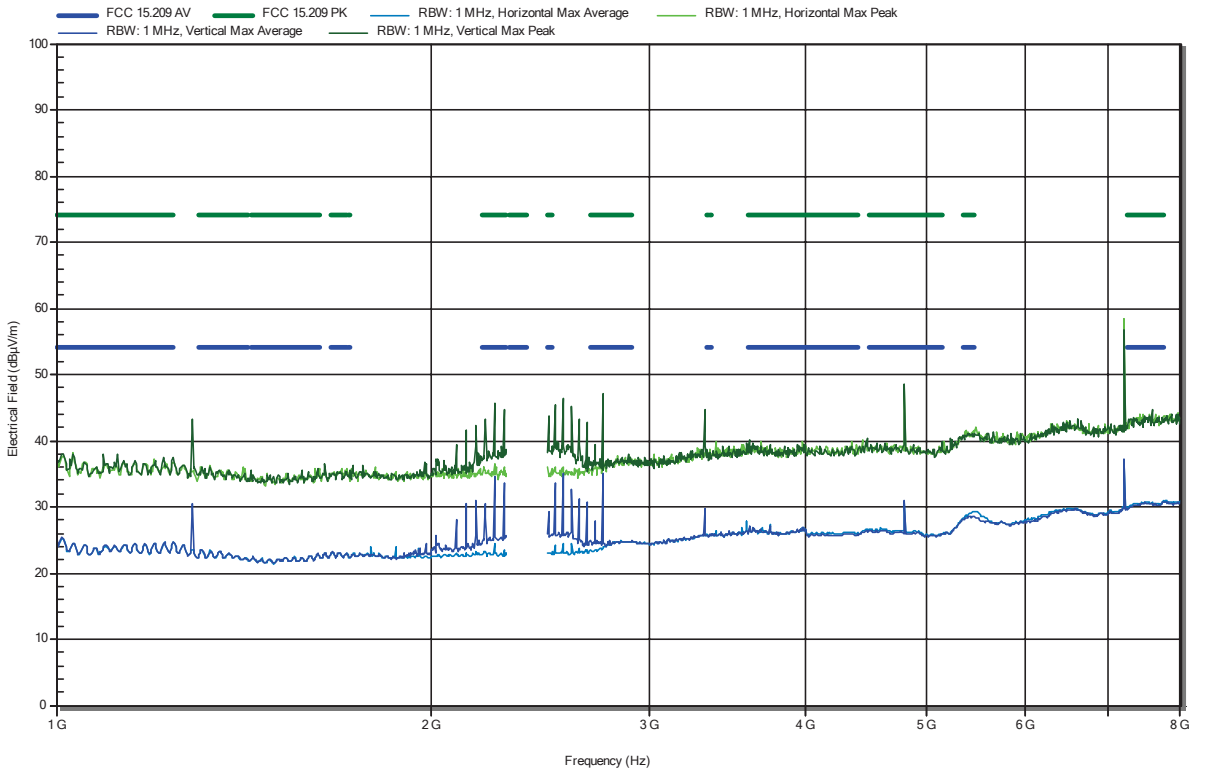
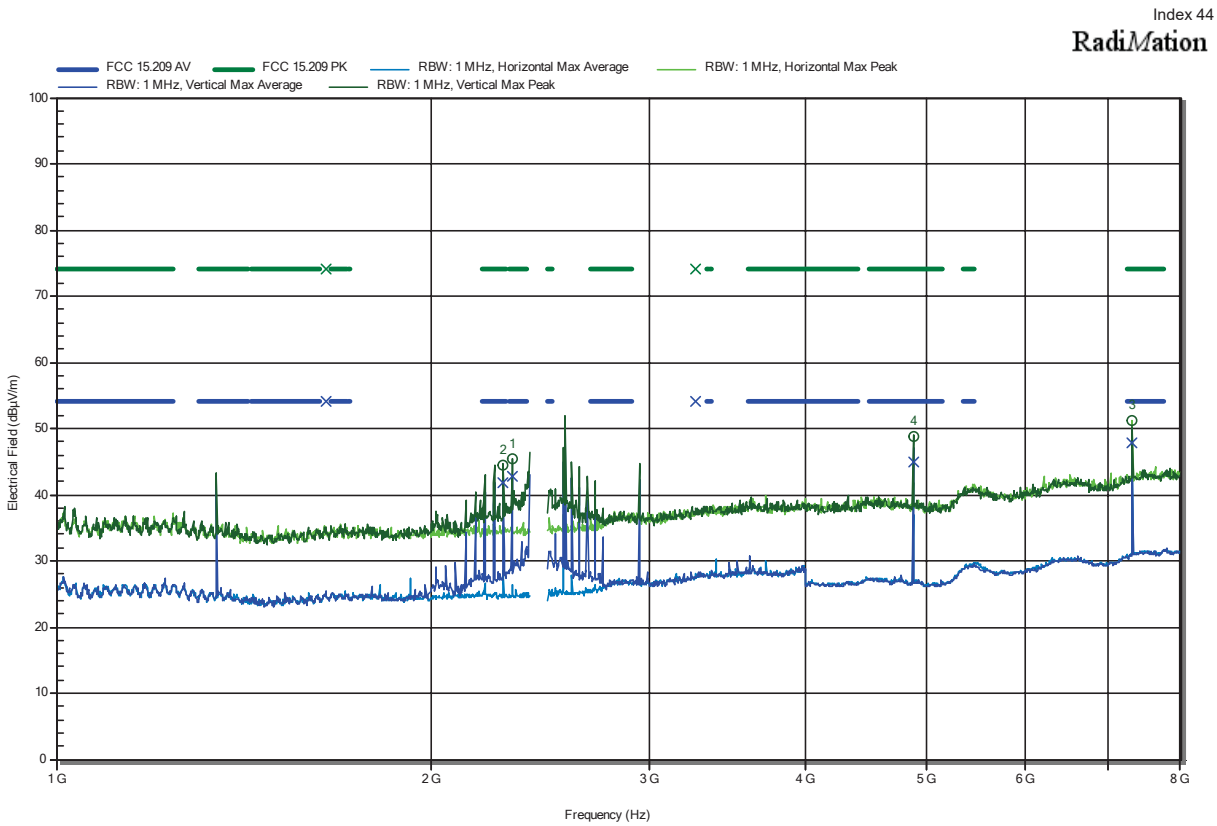
RadiMation



Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Antenna AA050031i; EUT#7.2
Test Date:	2022-03-30
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.2853 GHz	44.49 dBµV/m	74 dBµV/m	-29.51 dB	Pass	Vertical
2.3237 GHz	45.44 dBµV/m	74 dBµV/m	-28.56 dB	Pass	Vertical
4.8781 GHz	48.68 dBµV/m	74 dBµV/m	-25.32 dB	Pass	Vertical
7.3171 GHz	51.29 dBµV/m	74 dBµV/m	-22.71 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Antenna AA050031i; EUT#7.2
Test Date:	2022-03-30
Note:	

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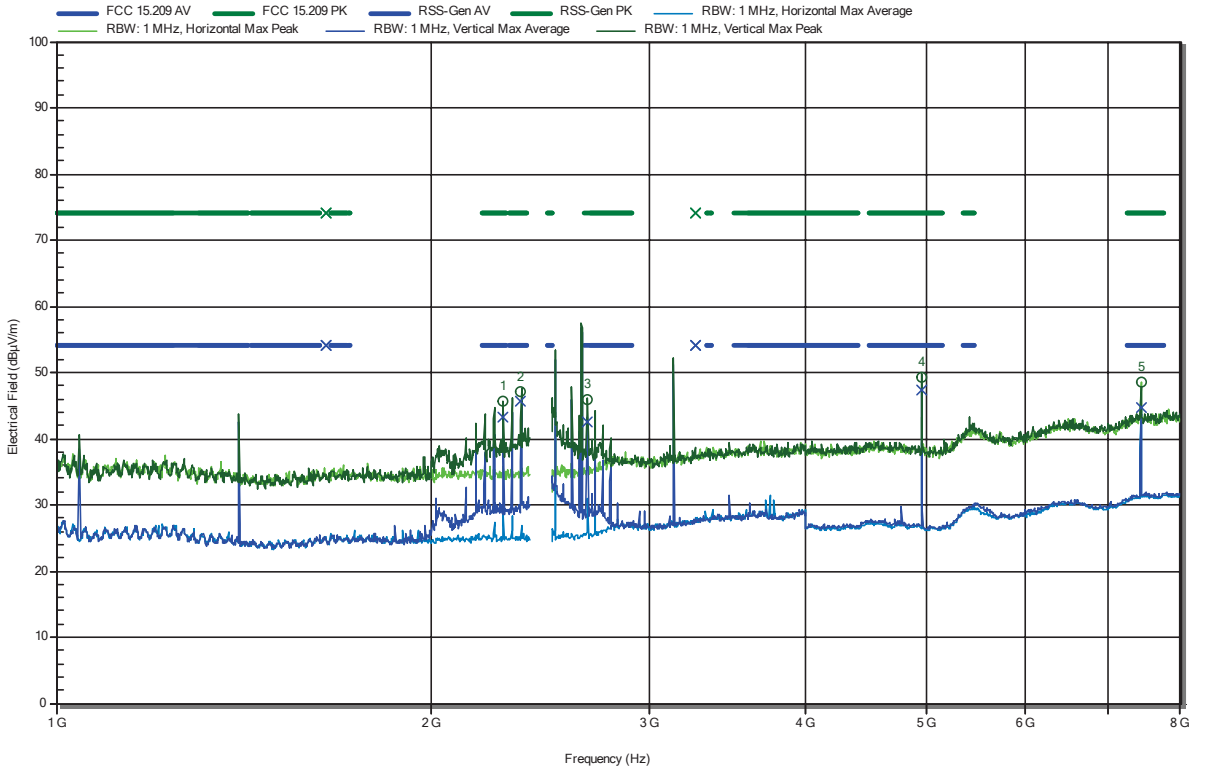
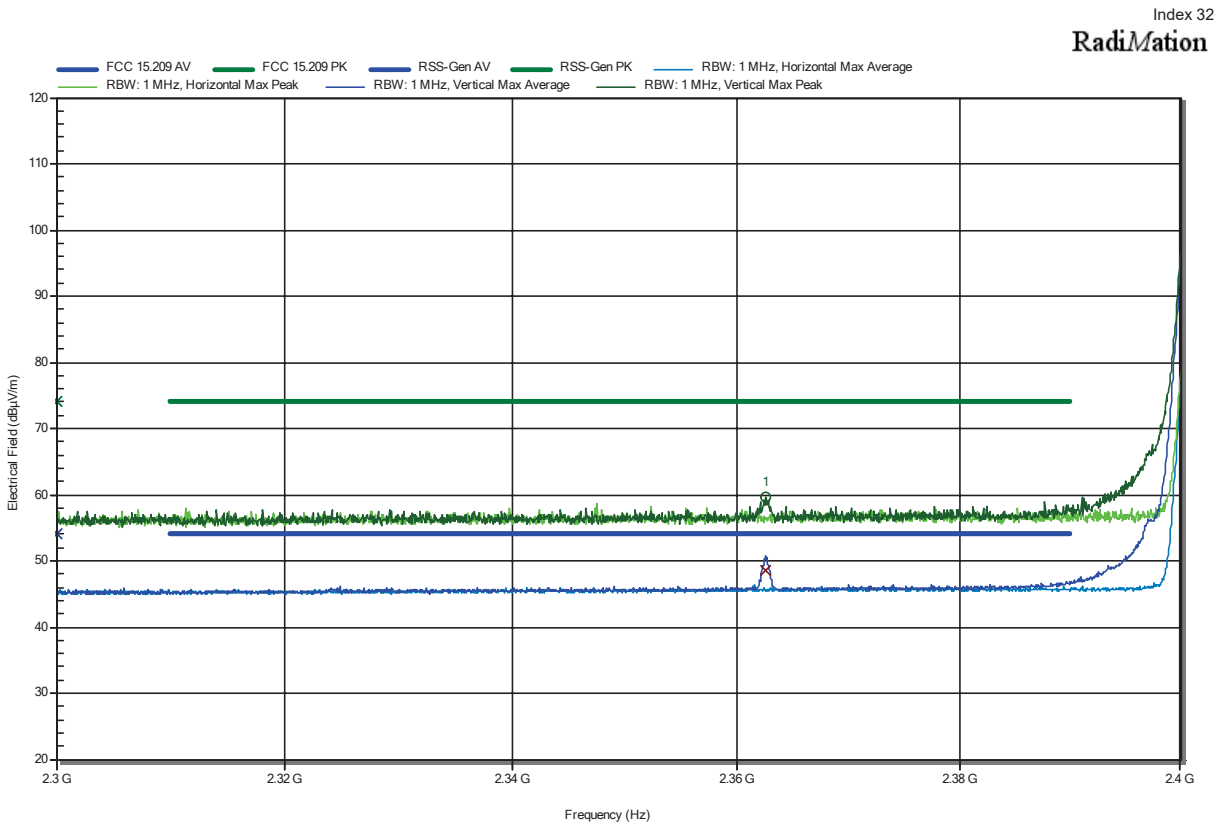
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.362 GHz	47.04 dBµV/m	74 dBµV/m	-26.96 dB	Pass	Vertical
2.669 GHz	46.02 dBµV/m	74 dBµV/m	-27.98 dB	Pass	Vertical
4.955 GHz	49.19 dBµV/m	74 dBµV/m	-24.81 dB	Pass	Vertical
7.432 GHz	48.52 dBµV/m	74 dBµV/m	-25.48 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Test Date:	2022-03-28
Note:	lower bandedge



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.3626 GHz	59.66 dBµV/m	74 dBµV/m	-14.34 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.3626 GHz	48.67 dBµV/m	54 dBµV/m	-5.33 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Test Date:	2022-03-28
Note:	upper bandedge

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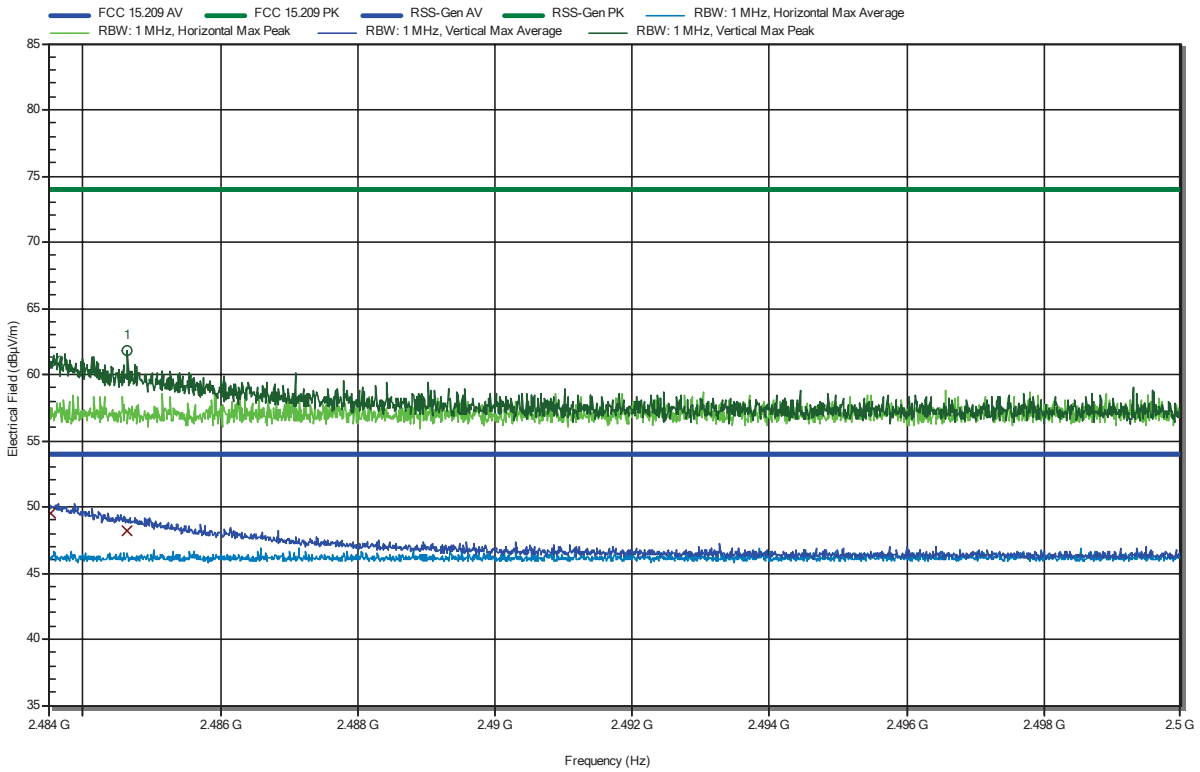
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.4835 GHz	60.96 dBµV/m	74 dBµV/m	-13.04 dB	Pass	Vertical
2.4846 GHz	61.83 dBµV/m	74 dBµV/m	-12.17 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.4835 GHz	49.54 dBµV/m	54 dBµV/m	-4.46 dB	Pass	Vertical
2.4846 GHz	48.14 dBµV/m	54 dBµV/m	-5.86 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Antenna AA050031; EUT#7.2
Test Date:	2022-03-30
Note:	

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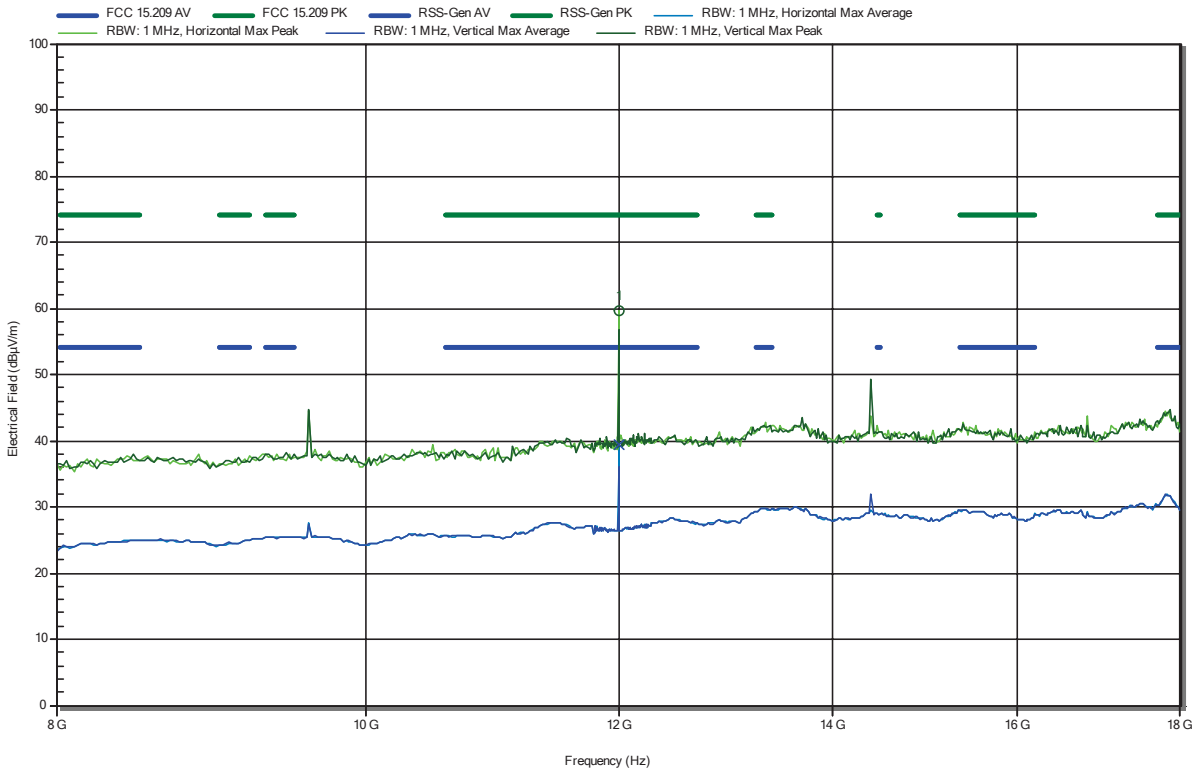
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.005 GHz	59.73 dBµV/m	74 dBµV/m	-14.27 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Antenna AA050031; EUT#7.2
Test Date:	2022-03-30
Note:	

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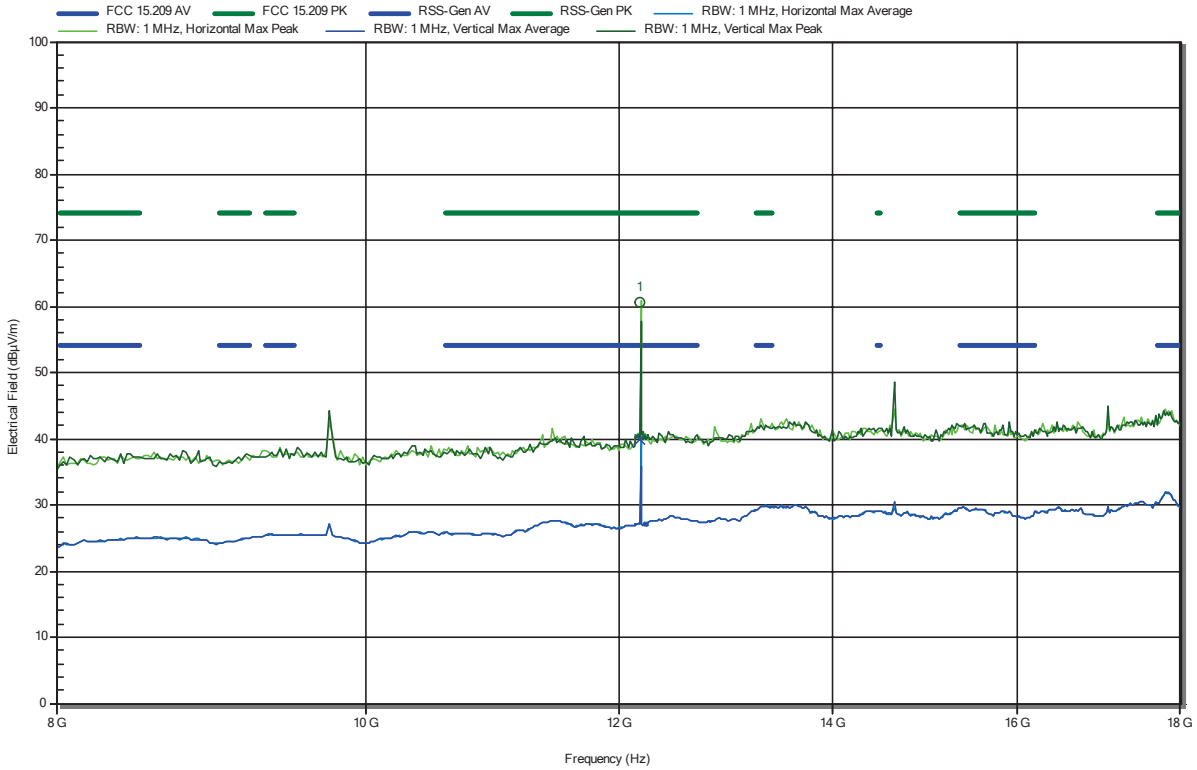
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.194 GHz	60.68 dBµV/m	74 dBµV/m	-13.32 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 22 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Antenna AA050031; EUT#7.2
Test Date:	2022-03-30
Note:	

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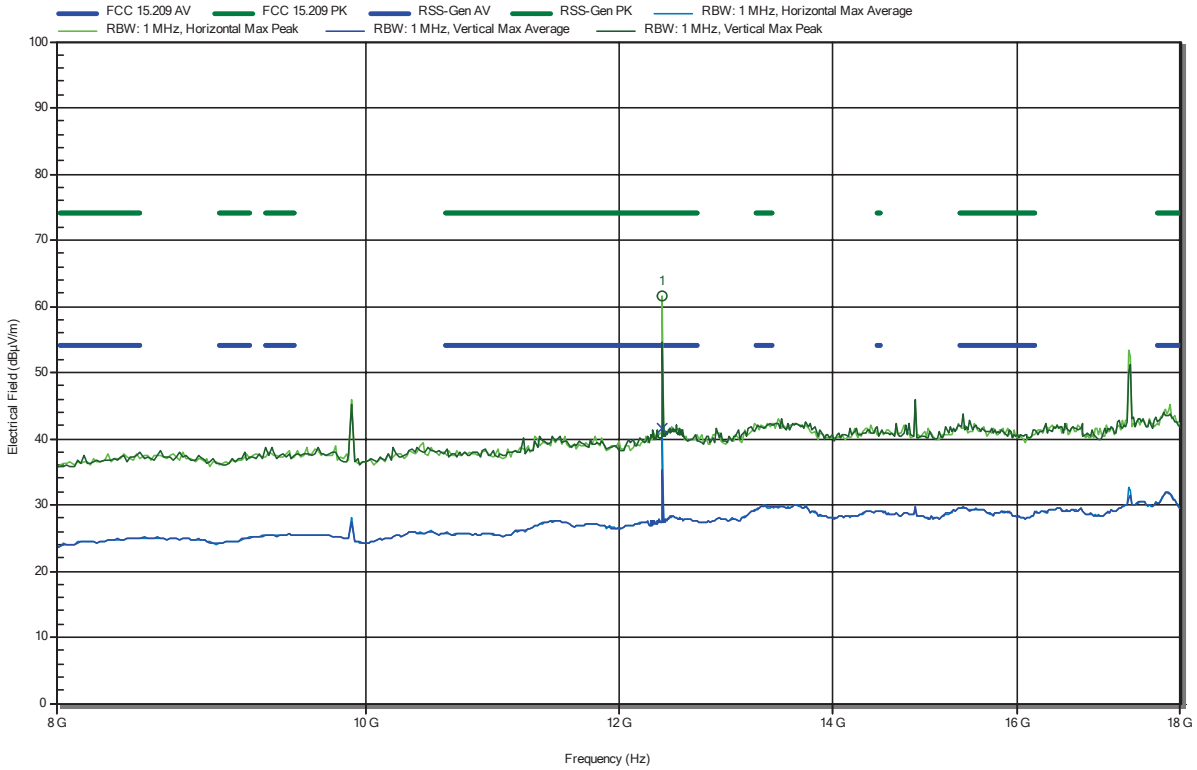
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.386 GHz	61.64 dBµV/m	74 dBµV/m	-12.36 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Test Date:	2022-03-31
Note:	

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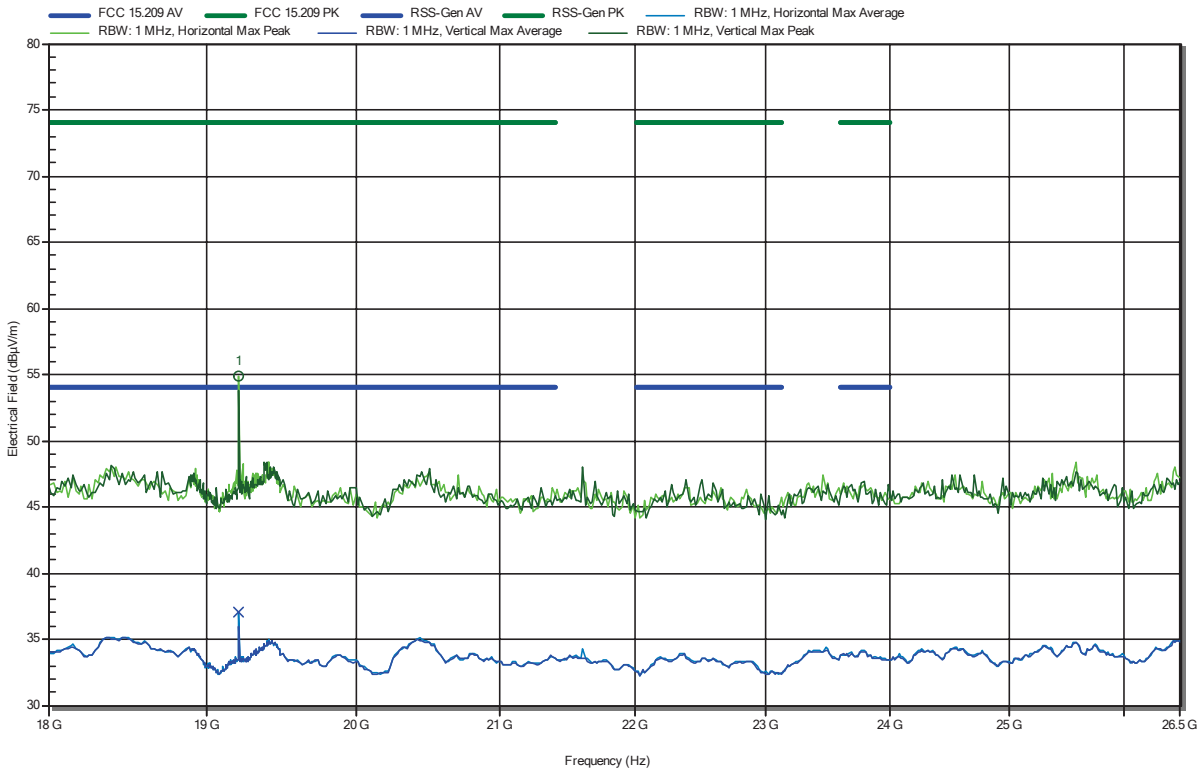
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
19.207 GHz	54.85 dBµV/m	74 dBµV/m	-19.15 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Test Date:	2022-03-31
Note:	

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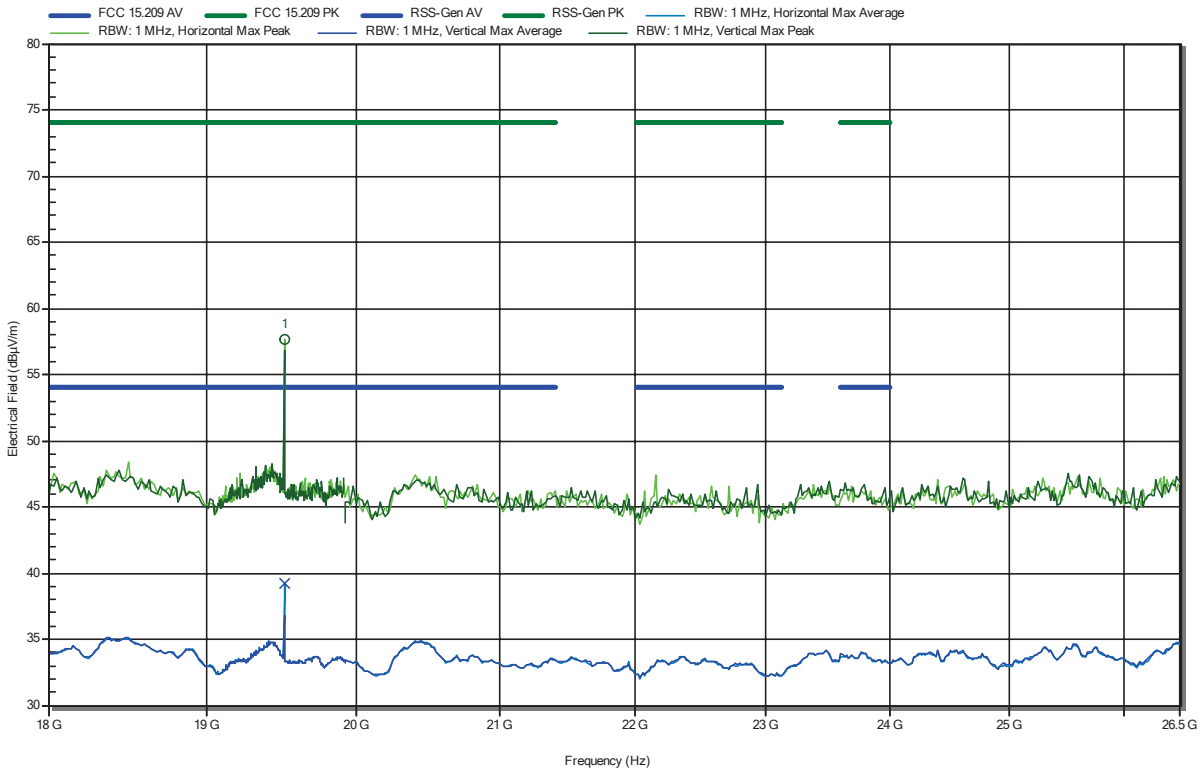
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
19.513 GHz	57.6 dBµV/m	74 dBµV/m	-16.4 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Dipol coaxial antenna AA050031; EUT#7.2
Test Date:	2022-03-31
Note:	

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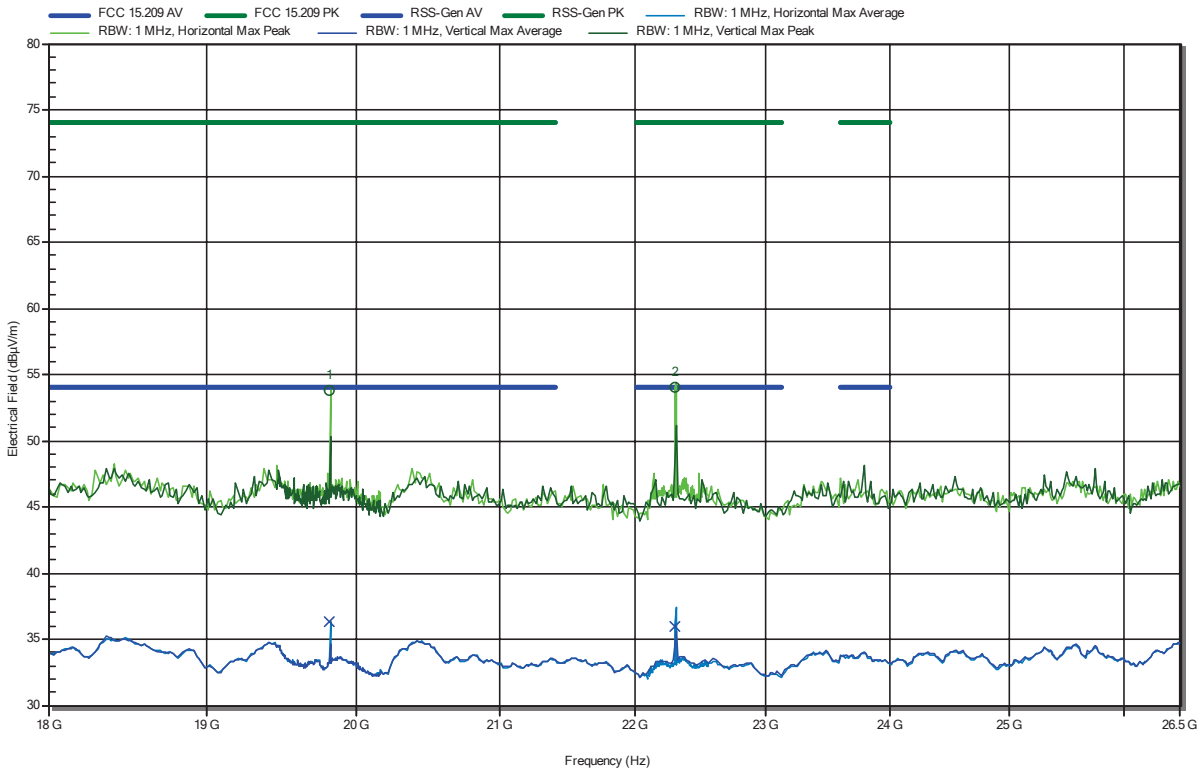
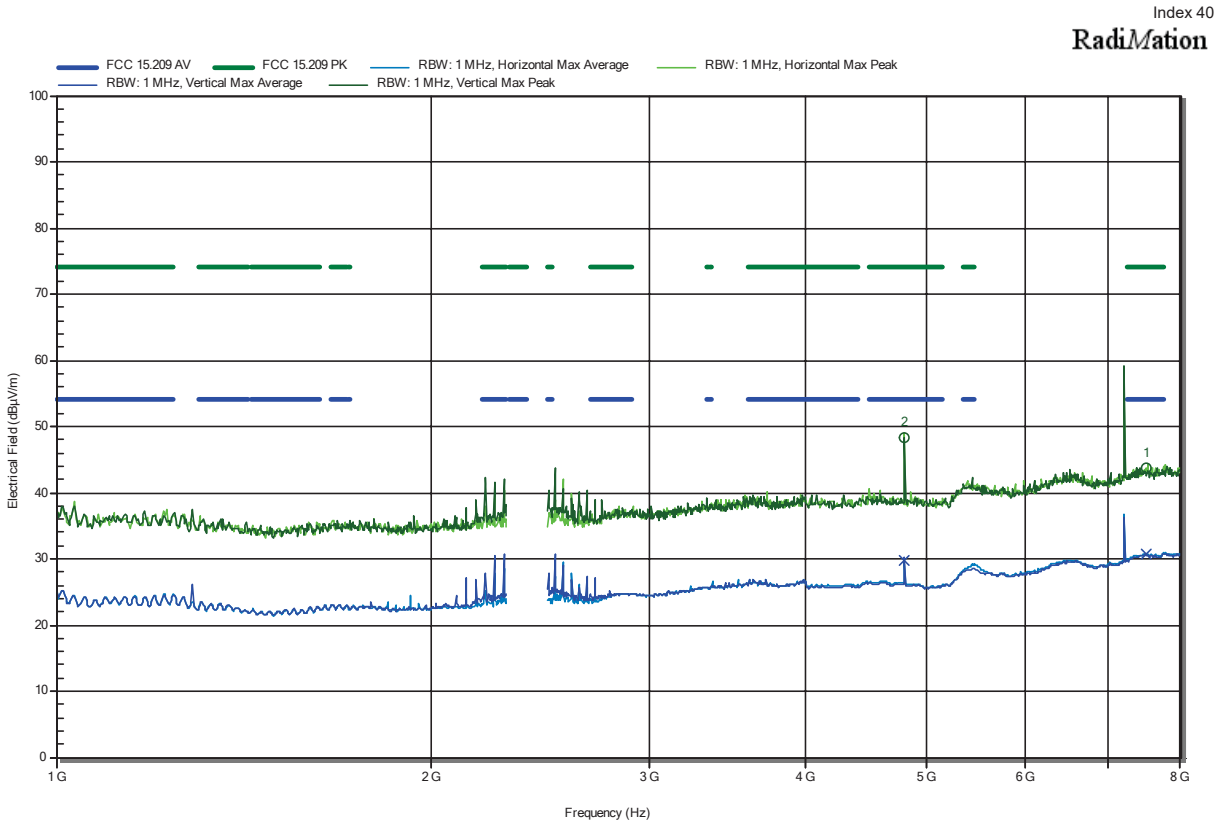
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
19.819 GHz	53.8 dBµV/m	74 dBµV/m	-20.2 dB	Pass	Horizontal
22.296 GHz	54.04 dBµV/m	74 dBµV/m	-19.96 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

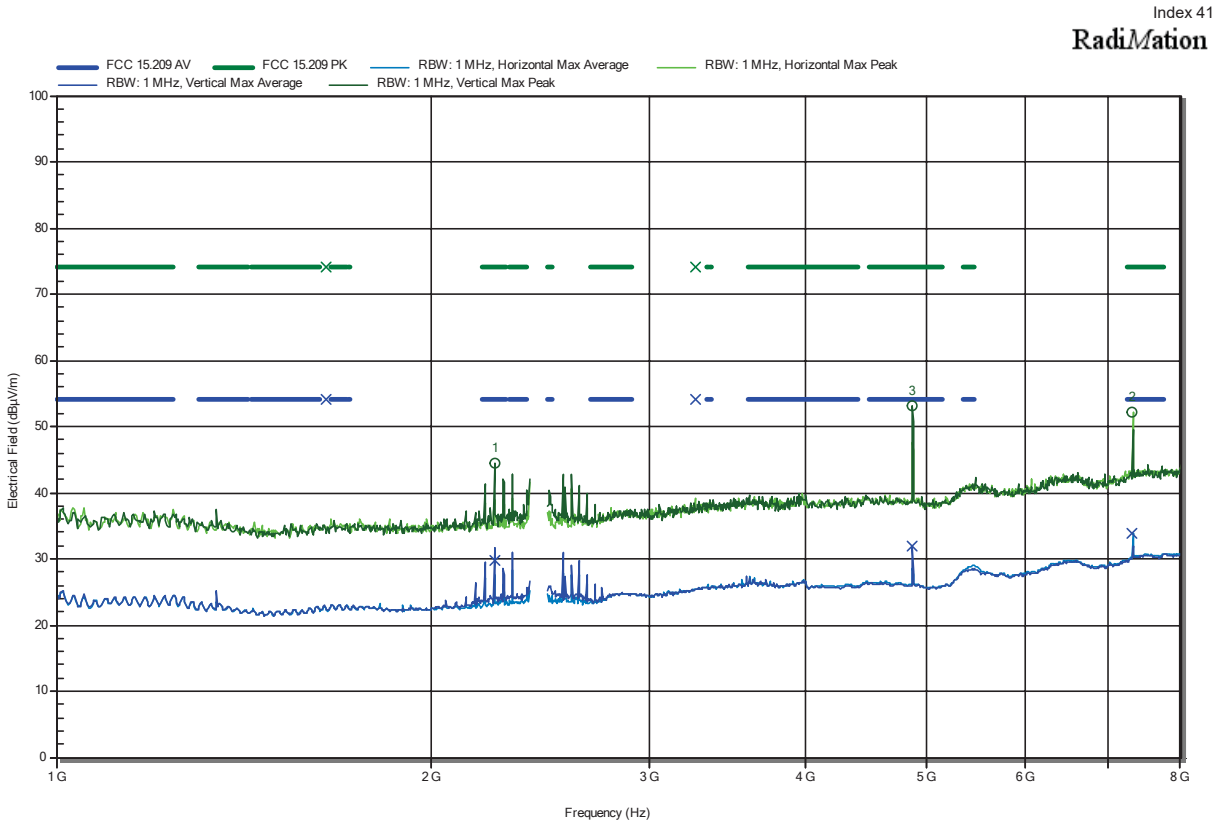
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Antenna AA030018; EUT#7.2 mode 6
Test Date:	2022-03-29
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.8 GHz	48.28 dBµV/m	74 dBµV/m	-25.72 dB	Pass	Vertical
7.504 GHz	43.63 dBµV/m	74 dBµV/m	-30.37 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

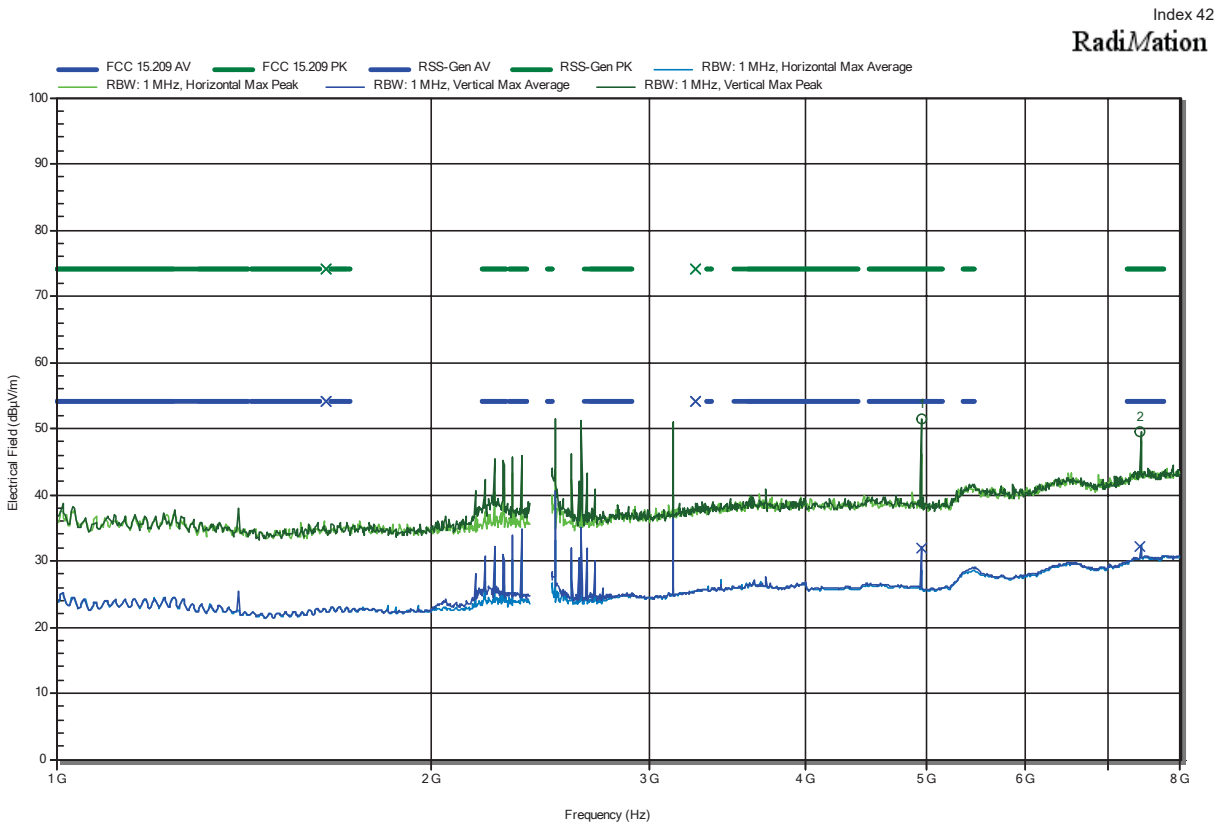
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Antenna AA030018; EUT#7.2 mode 6
Test Date:	2022-03-29
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.2488 GHz	44.53 dBµV/m	74 dBµV/m	-29.47 dB	Pass	Vertical
4.872 GHz	53.11 dBµV/m	74 dBµV/m	-20.89 dB	Pass	Vertical
7.32 GHz	52.27 dBµV/m	74 dBµV/m	-21.73 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

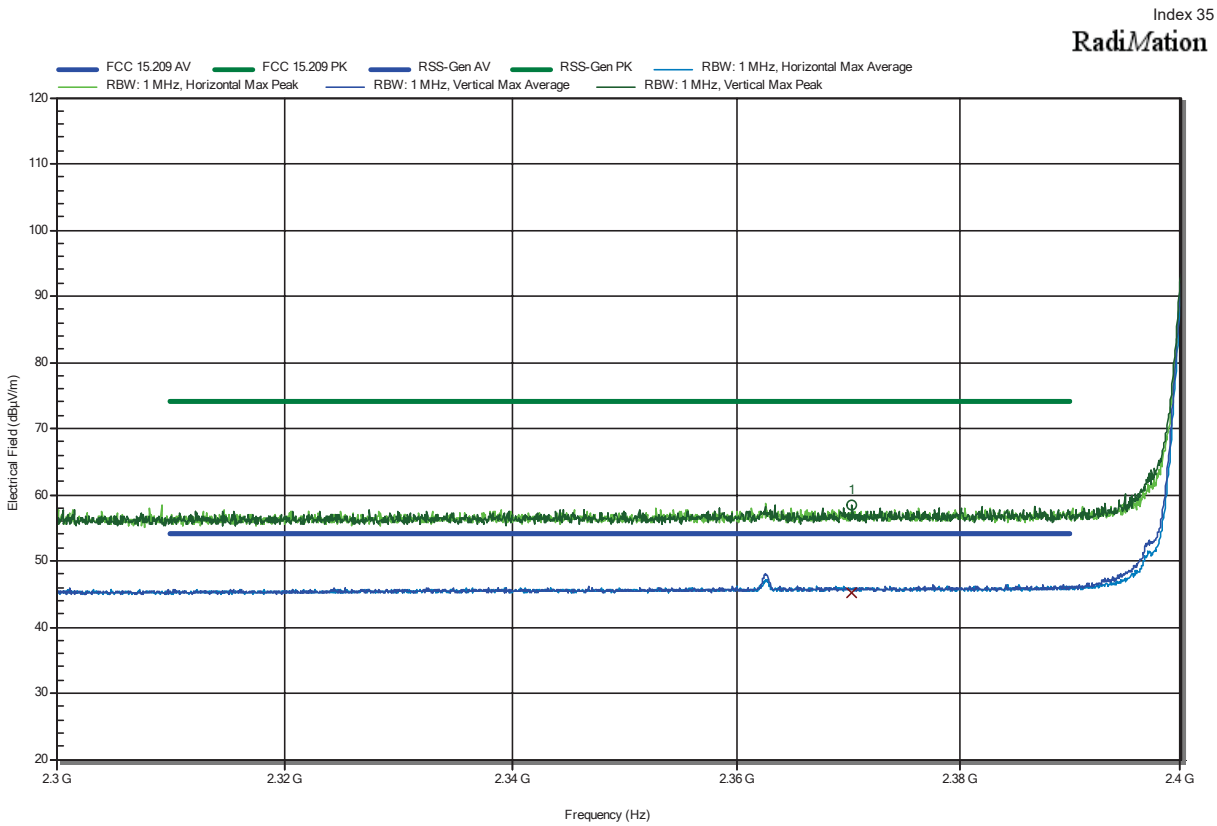
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Antenna AA030018; EUT#7.2 mode 6
Test Date:	2022-03-29
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.952 GHz	51.49 dBµV/m	74 dBµV/m	-22.51 dB	Pass	Vertical
7.432 GHz	49.47 dBµV/m	74 dBµV/m	-24.53 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Antenna AA030018; EUT#7.2 mode 2
Test Date:	2022-03-28
Note:	lower bandedge



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.3704 GHz	58.54 dBµV/m	74 dBµV/m	-15.46 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.3704 GHz	45.11 dBµV/m	54 dBµV/m	-8.89 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Antenna AA030018; EUT#7.2 mode 2
Test Date:	2022-03-28
Note:	upper bandedge

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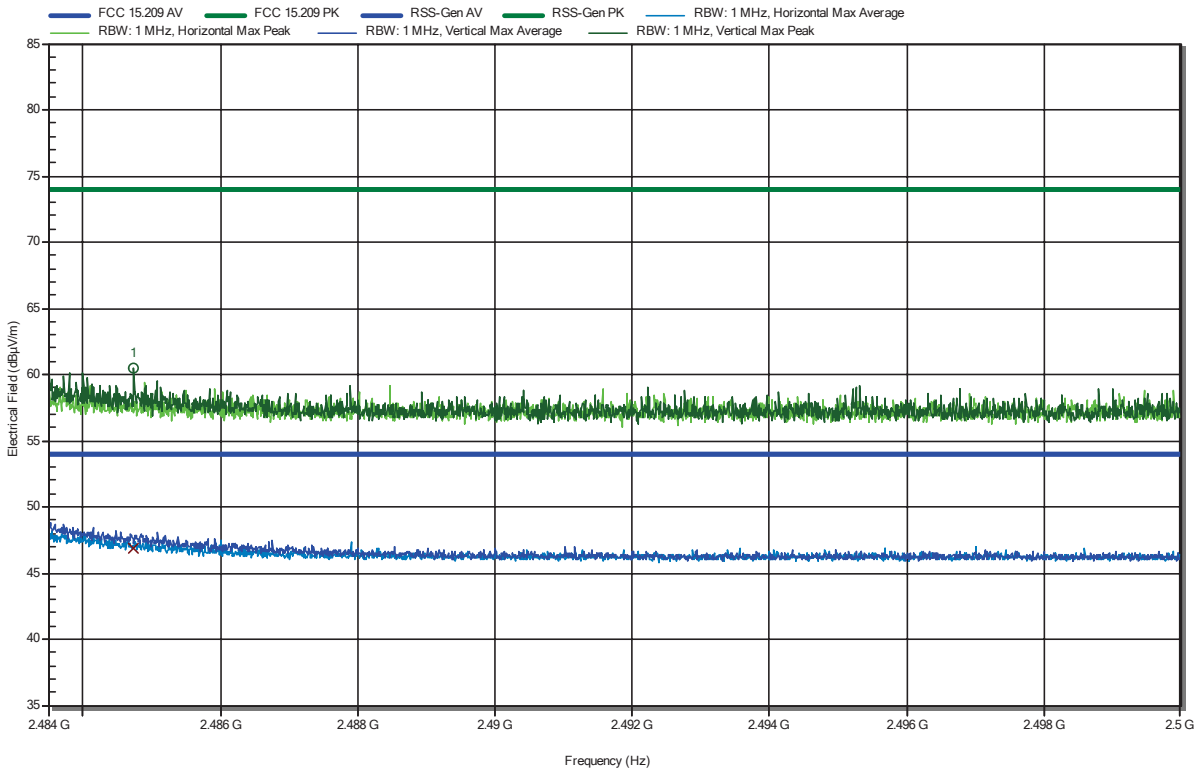
RadiMation

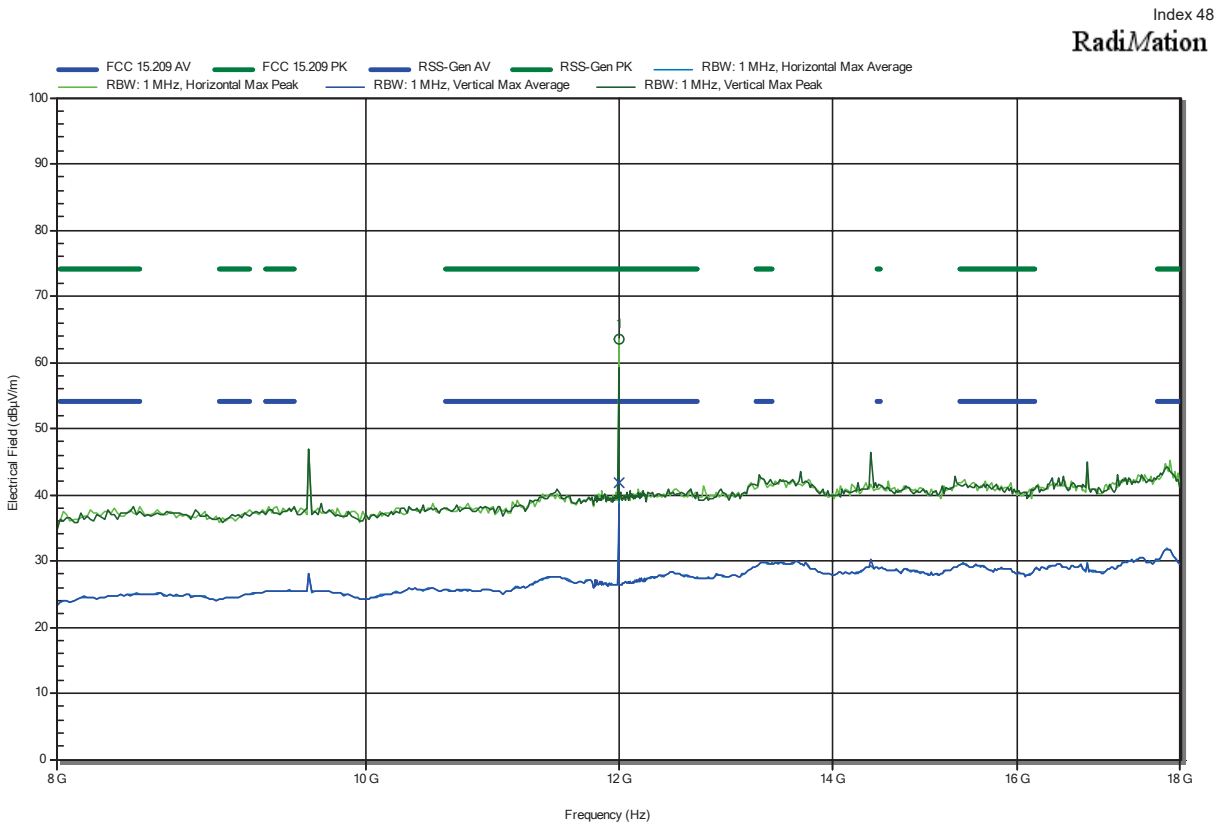


Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.4847 GHz	60.49 dBµV/m	74 dBµV/m	-13.51 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.4847 GHz	46.89 dBµV/m	54 dBµV/m	-7.11 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

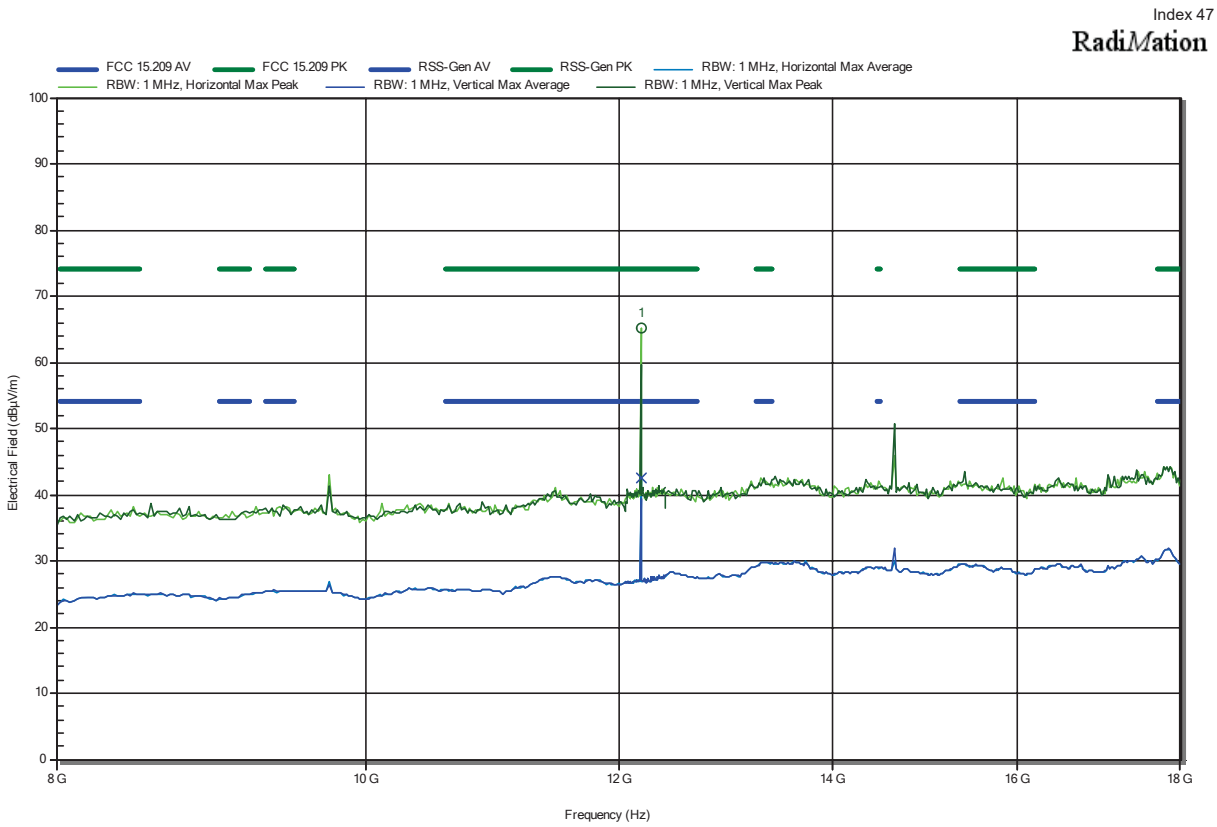
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Antenna AA030018; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.005 GHz	63.46 dBµV/m	74 dBµV/m	-10.54 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Antenna AA030018; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.195 GHz	65.12 dBµV/m	74 dBµV/m	-8.88 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Antenna AA030018; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	

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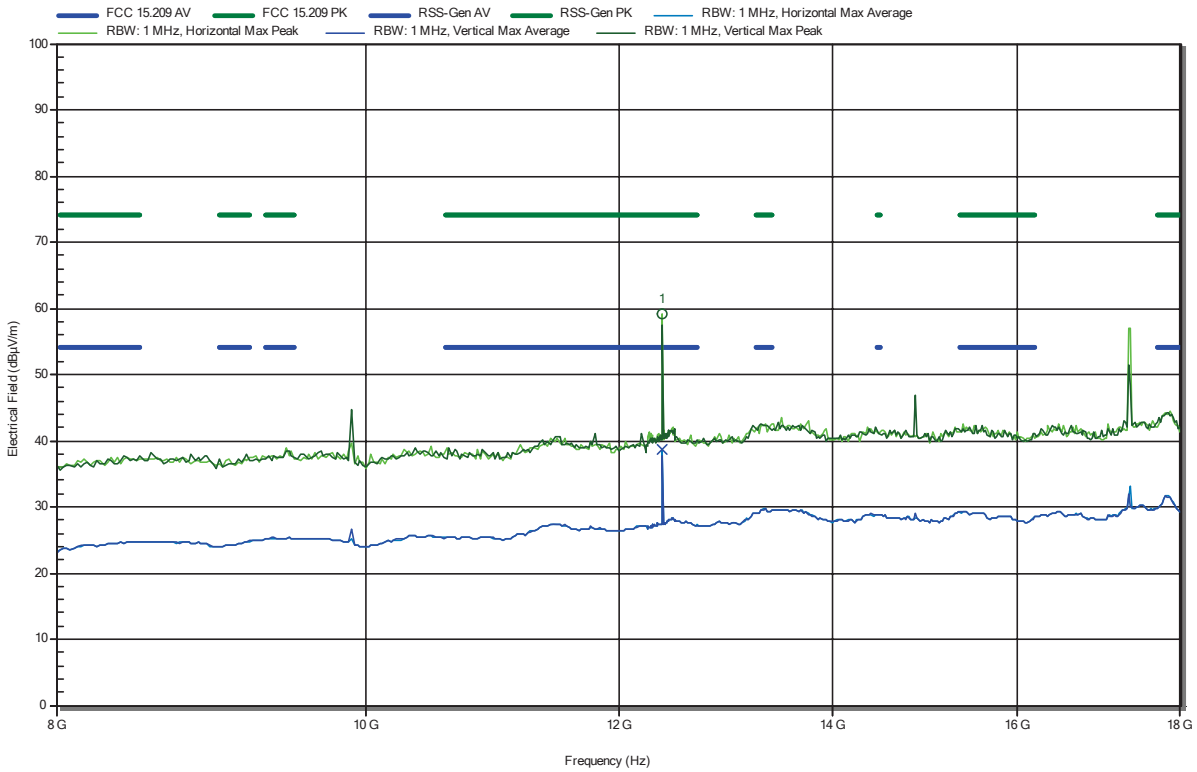
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.387 GHz	59.12 dBµV/m	74 dBµV/m	-14.88 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Antenna AA030018; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	

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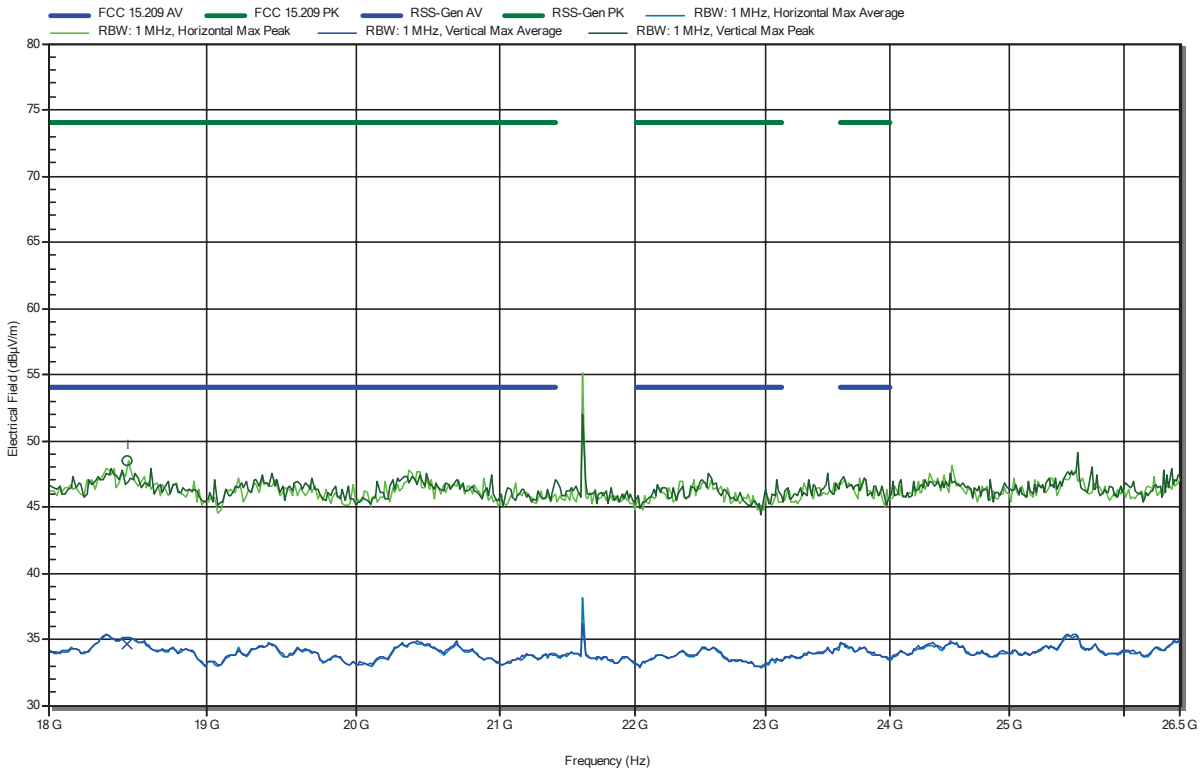
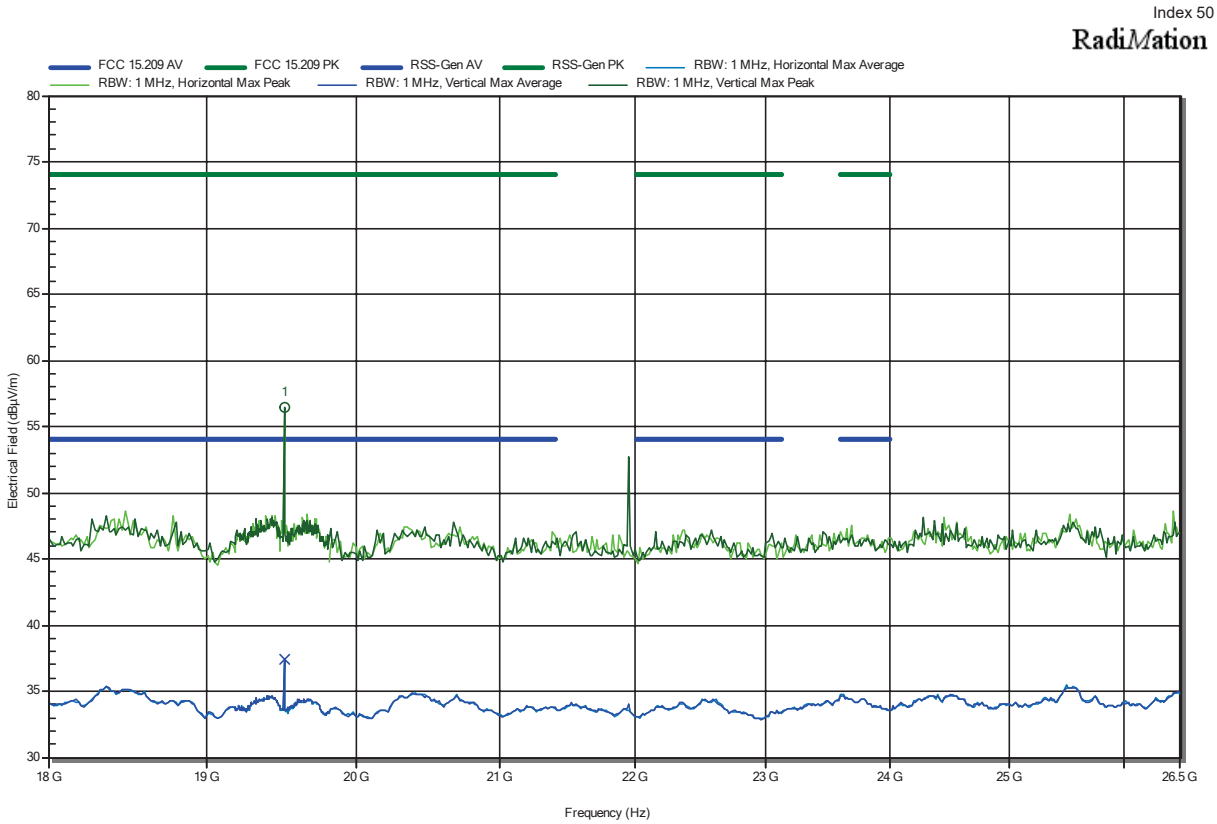
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
18.493 GHz	48.5 dBµV/m	74 dBµV/m	-25.5 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Antenna AA030018; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
19.511 GHz	56.5 dBµV/m	74 dBµV/m	-17.5 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39318
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Antenna AA030018; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	

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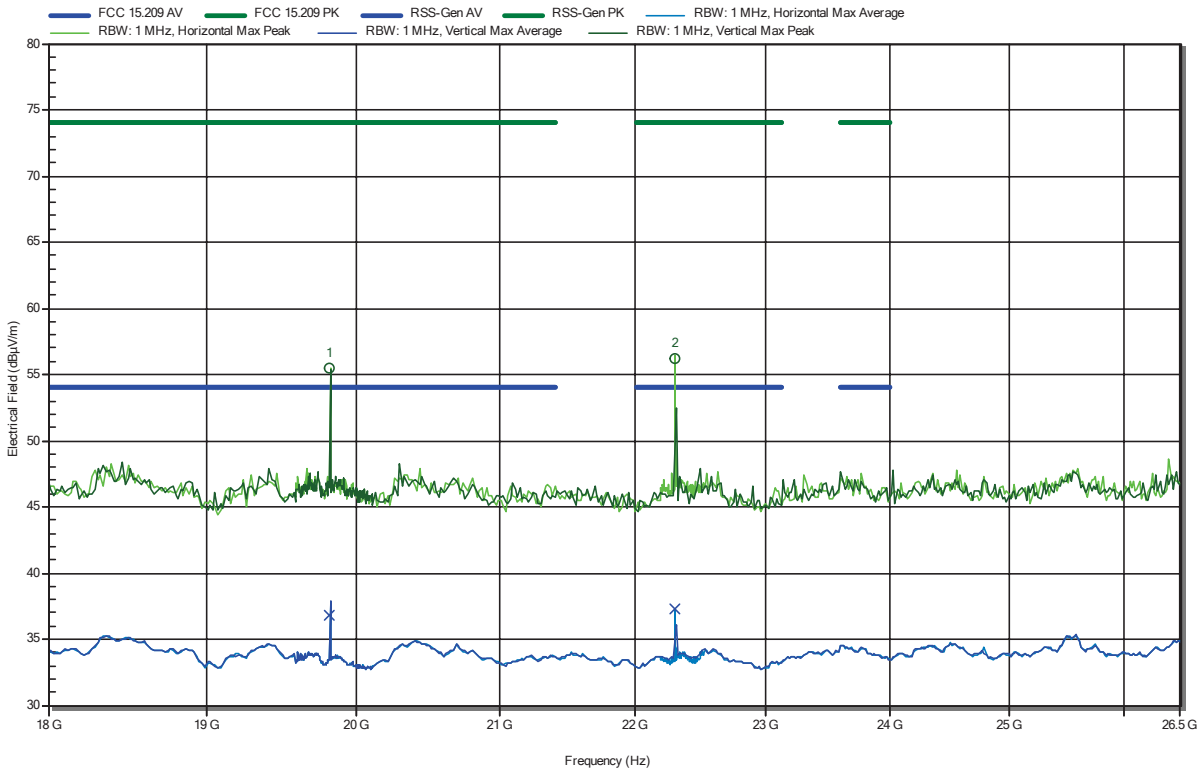
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
19.818 GHz	55.51 dBµV/m	74 dBµV/m	-18.49 dB	Pass	Horizontal
22.296 GHz	56.25 dBµV/m	74 dBµV/m	-17.75 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Antenna AA080004; EUT#7.2 mode 6
Test Date:	2022-03-29
Note:	

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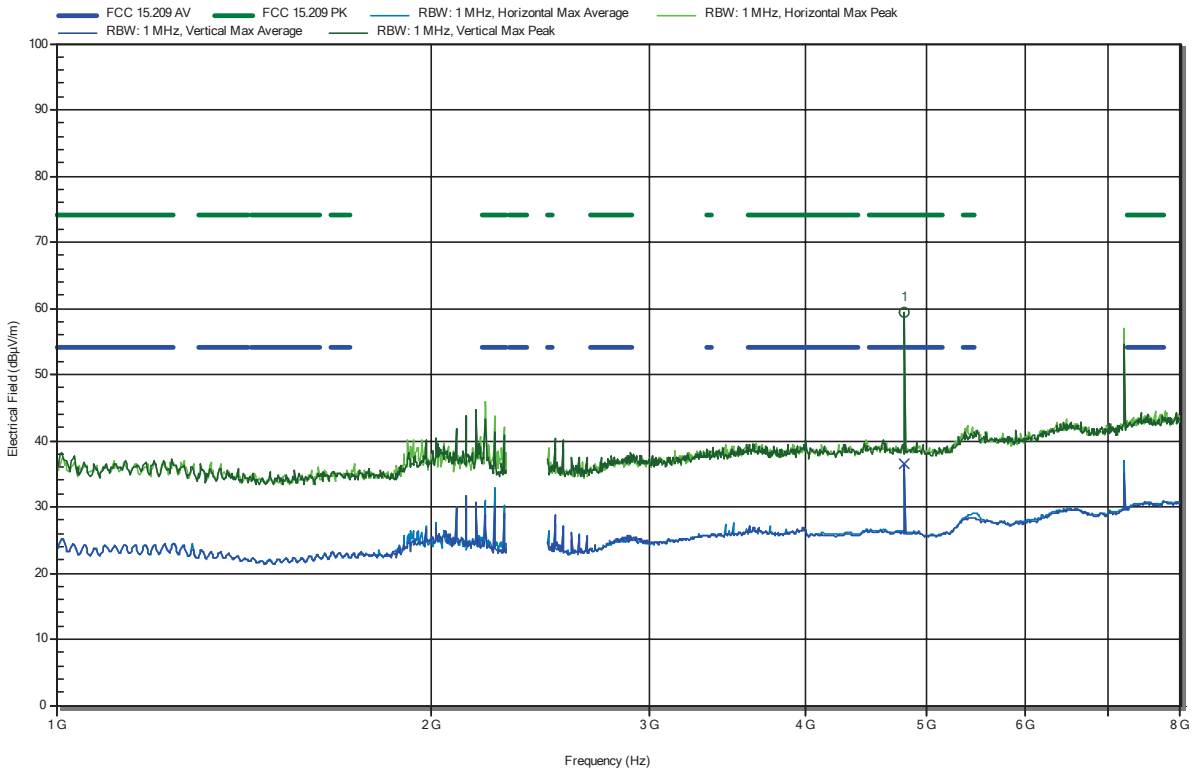
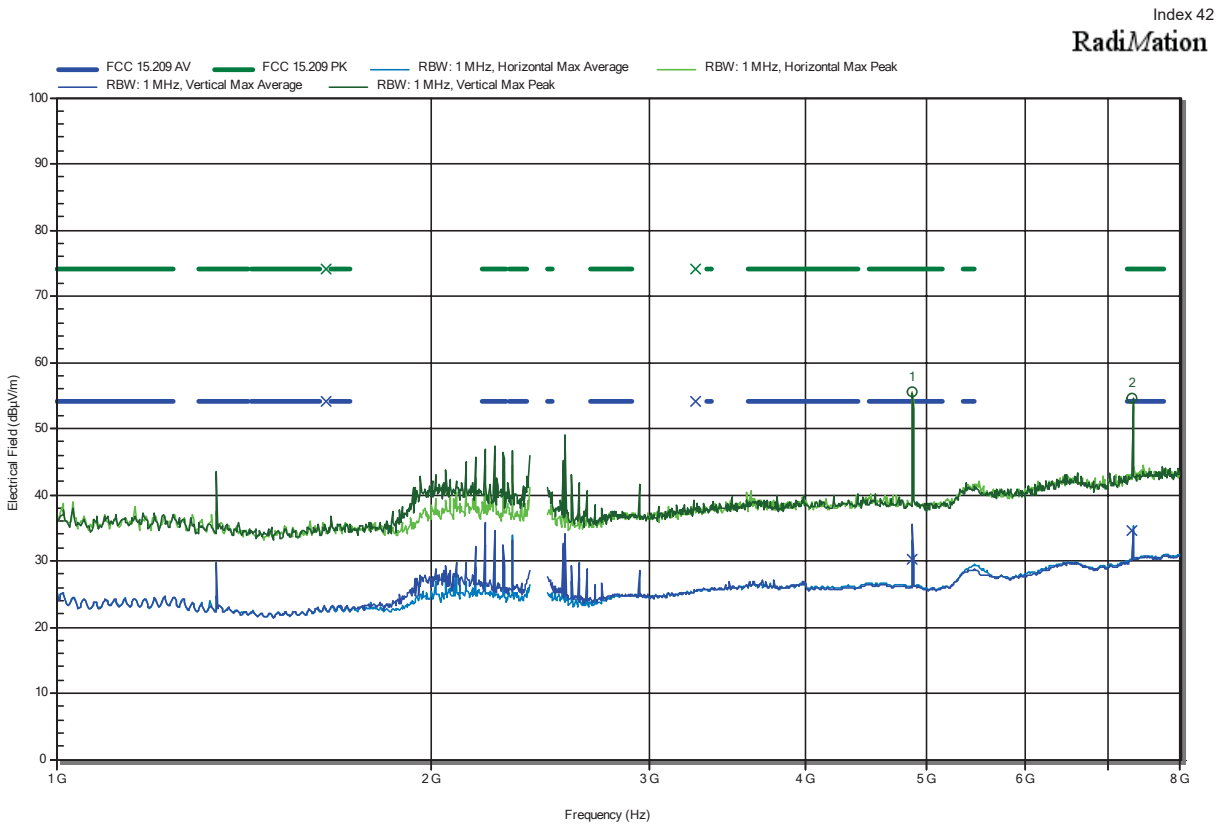
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.8 GHz	59.31 dBµV/m	74 dBµV/m	-14.69 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

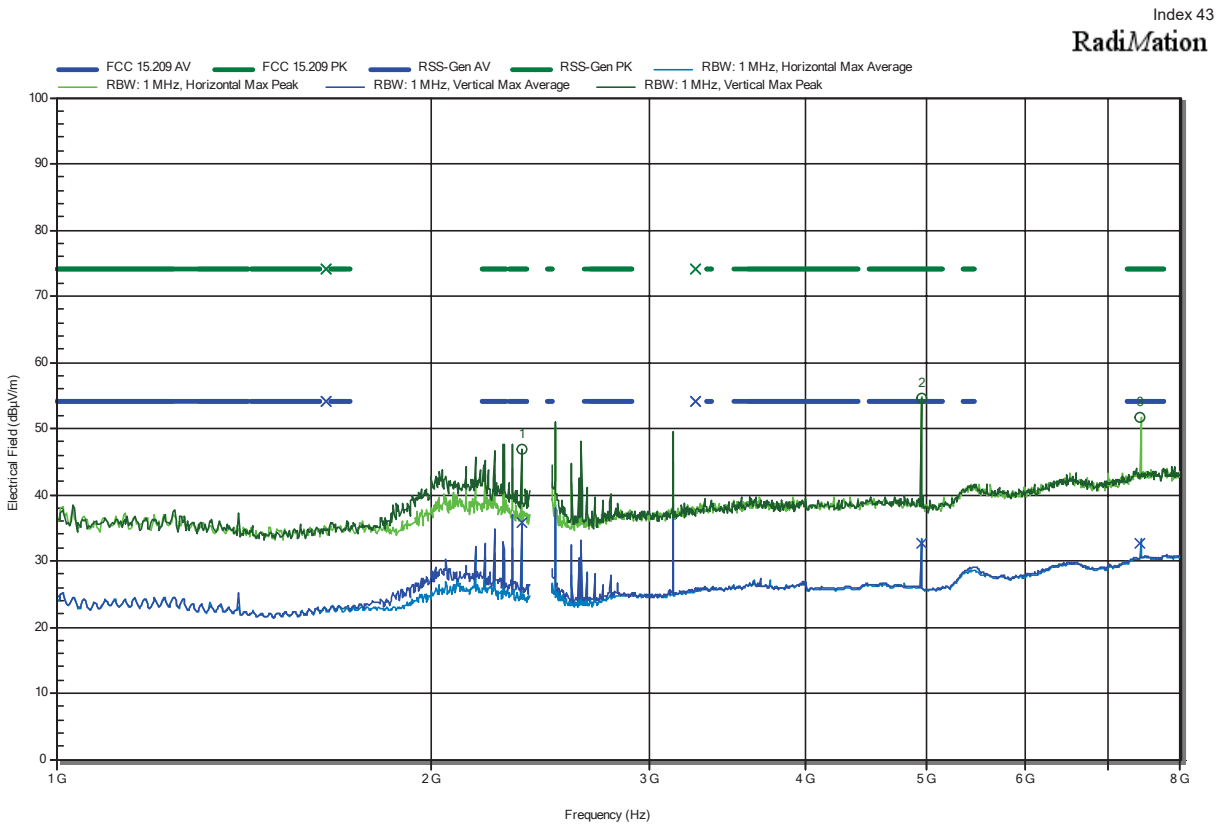
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Antenna AA080004; EUT#7.2 mode 6
Test Date:	2022-03-29
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.872 GHz	55.48 dBµV/m	74 dBµV/m	-18.52 dB	Pass	Horizontal
7.32 GHz	54.66 dBµV/m	74 dBµV/m	-19.34 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Antenna AA080004; EUT#7.2 mode 6
Test Date:	2022-03-29
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.364 GHz	46.98 dBµV/m	74 dBµV/m	-27.02 dB	Pass	Vertical
4.952 GHz	54.62 dBµV/m	74 dBµV/m	-19.38 dB	Pass	Vertical
7.432 GHz	51.72 dBµV/m	74 dBµV/m	-22.28 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Antenna AA080004; EUT#7.2 mode 2
Test Date:	2022-03-28
Note:	lower bandedge

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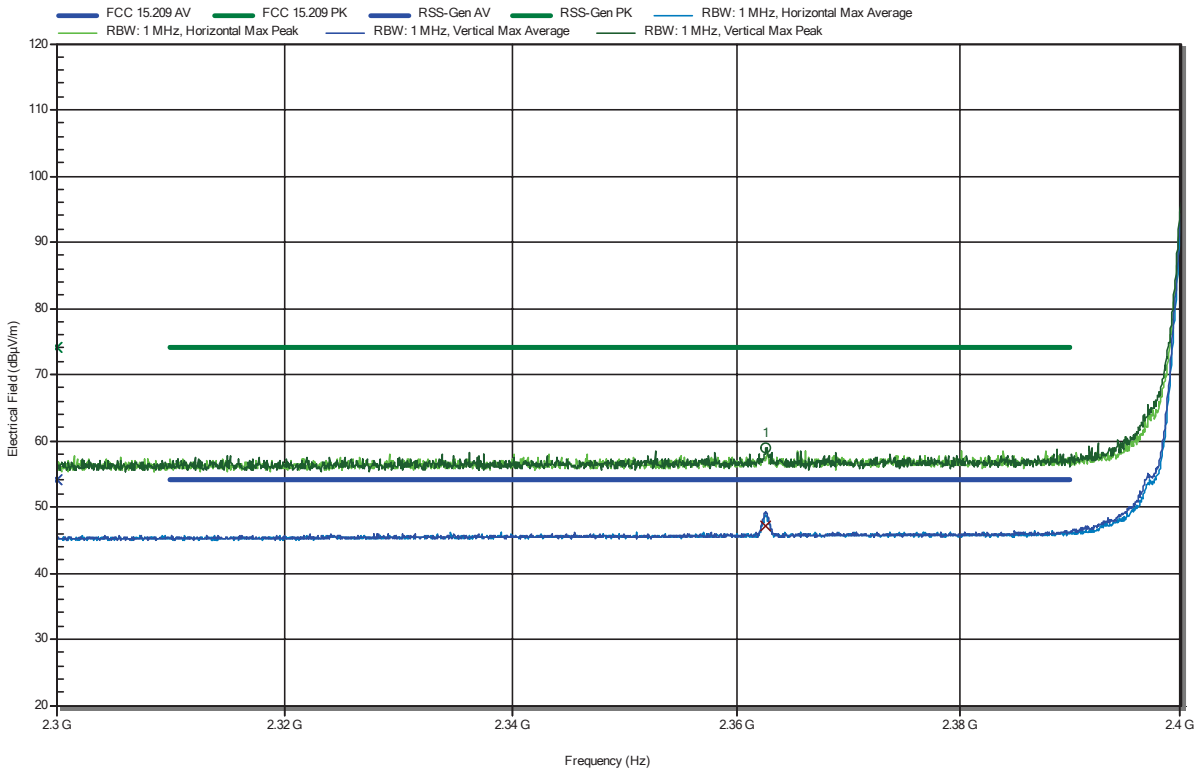
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.3626 GHz	58.86 dBµV/m	74 dBµV/m	-15.14 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Antenna AA080004; EUT#7.2 mode 2
Test Date:	2022-03-28
Note:	upper bandedge

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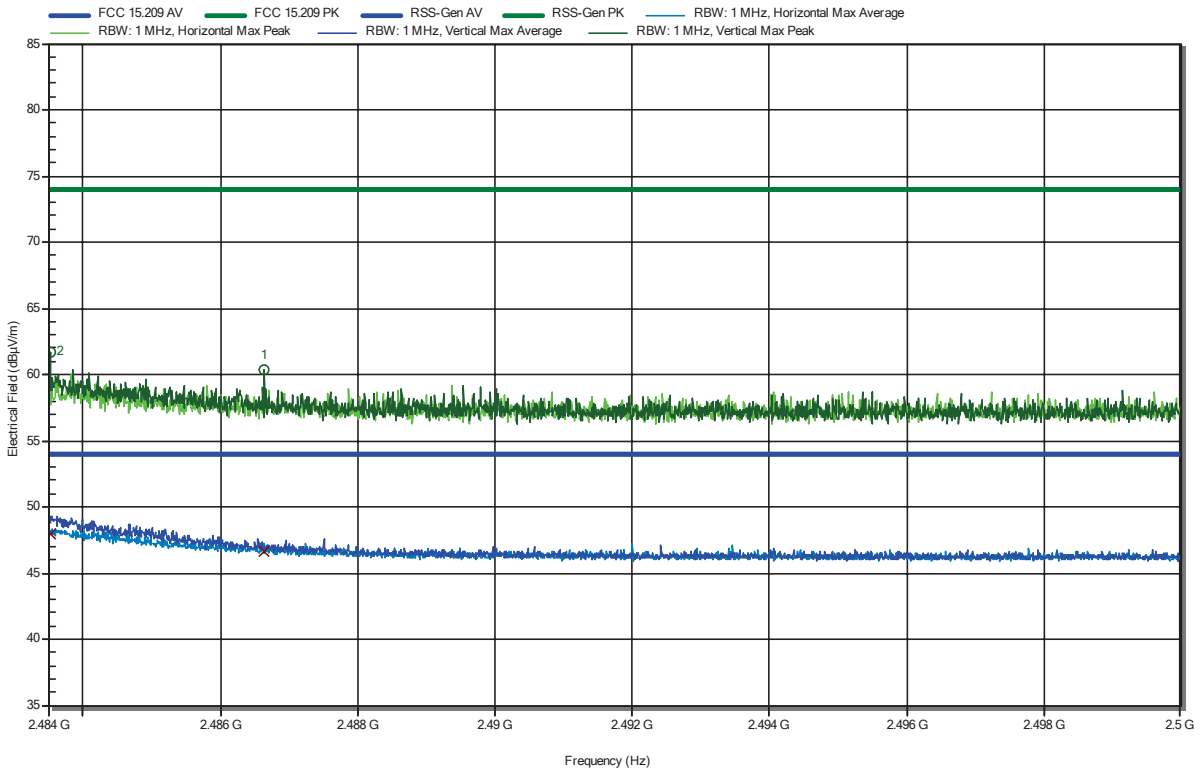
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.4835 GHz	61.74 dBµV/m	74 dBµV/m	-12.26 dB	Pass	Vertical
2.4866 GHz	60.36 dBµV/m	74 dBµV/m	-13.64 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Antenna AA080004; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	

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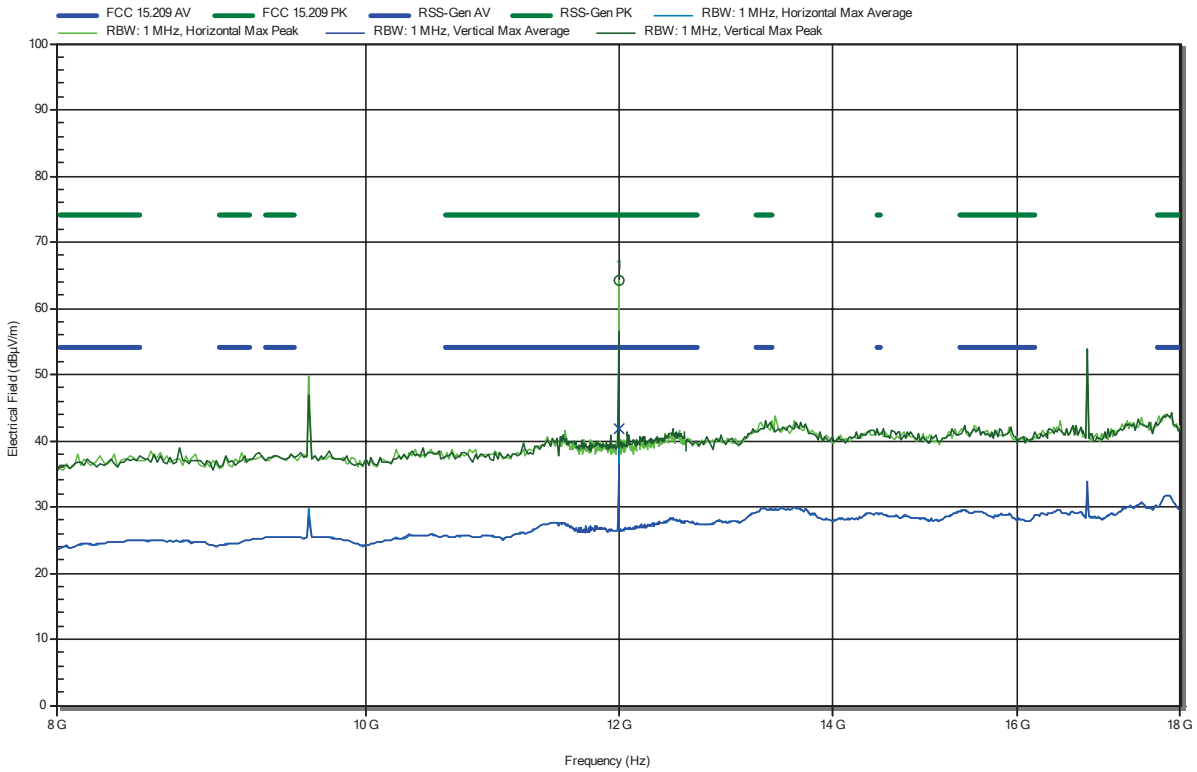
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.005 GHz	64.22 dBµV/m	74 dBµV/m	-9.78 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Antenna AA080004; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	

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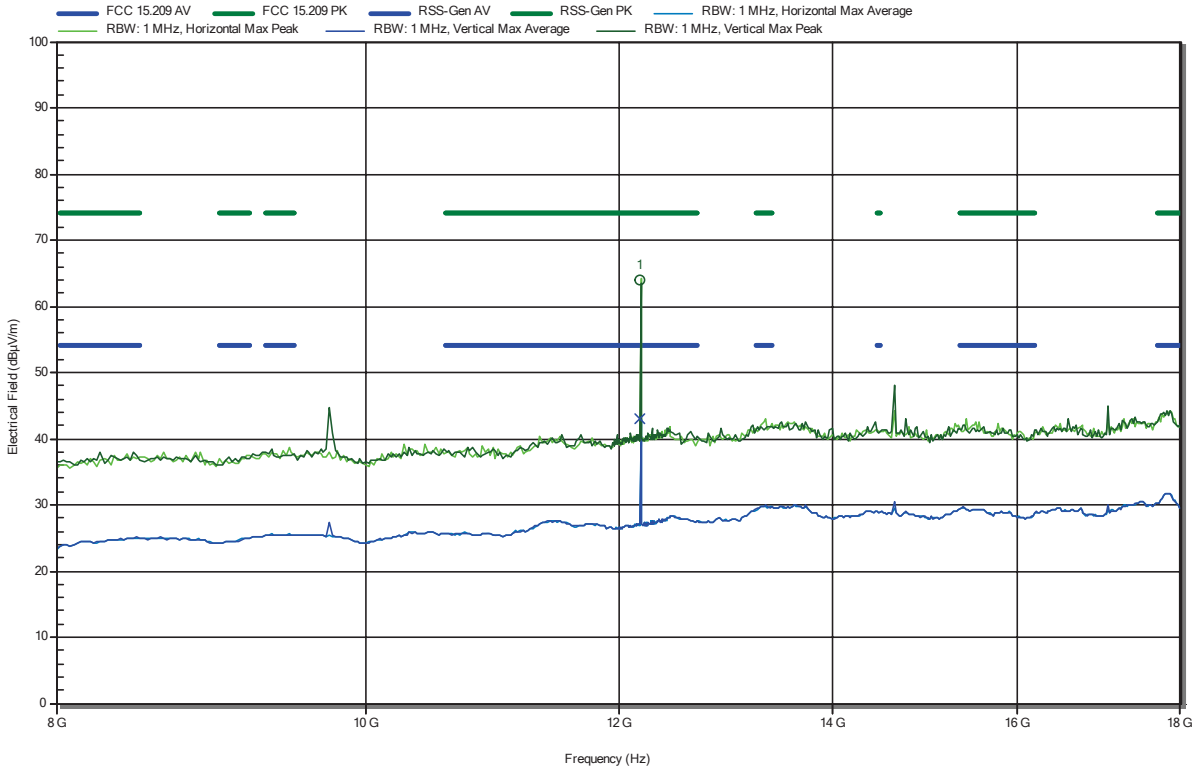
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.194 GHz	64.08 dBµV/m	74 dBµV/m	-9.92 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Antenna AA080004; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	

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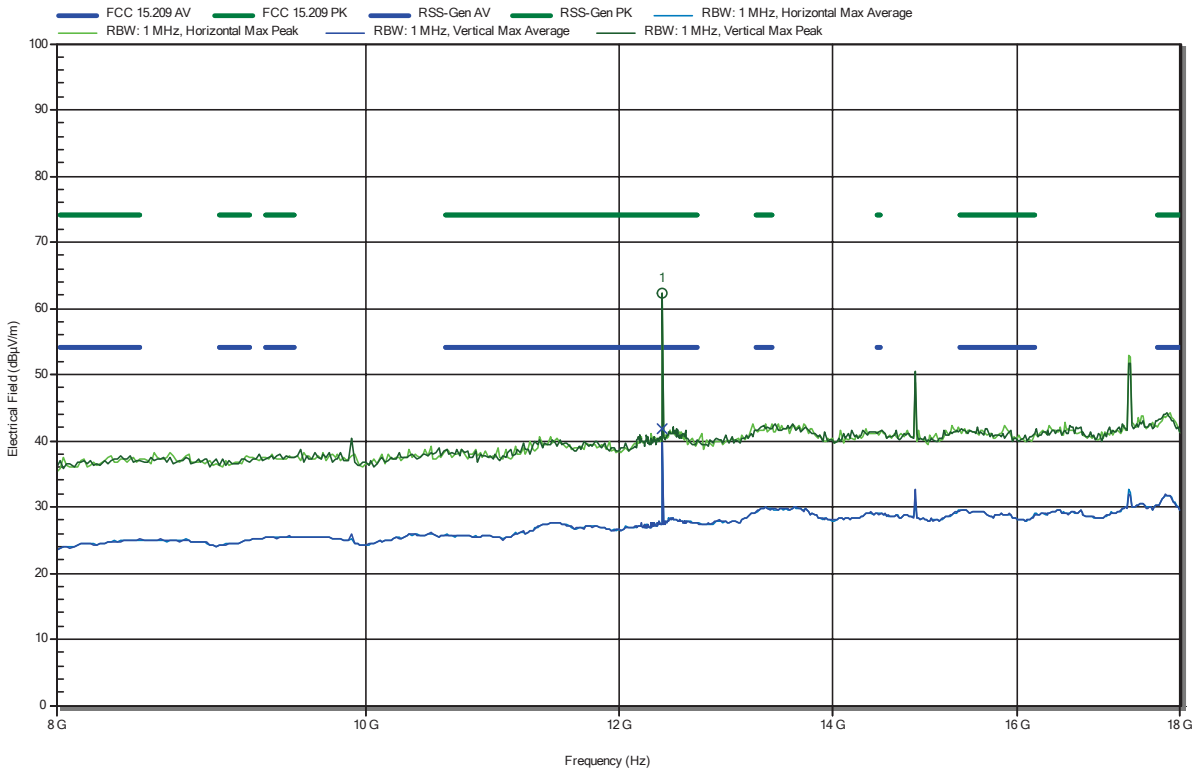
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.387 GHz	62.35 dBµV/m	74 dBµV/m	-11.65 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Antenna AA080004; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	

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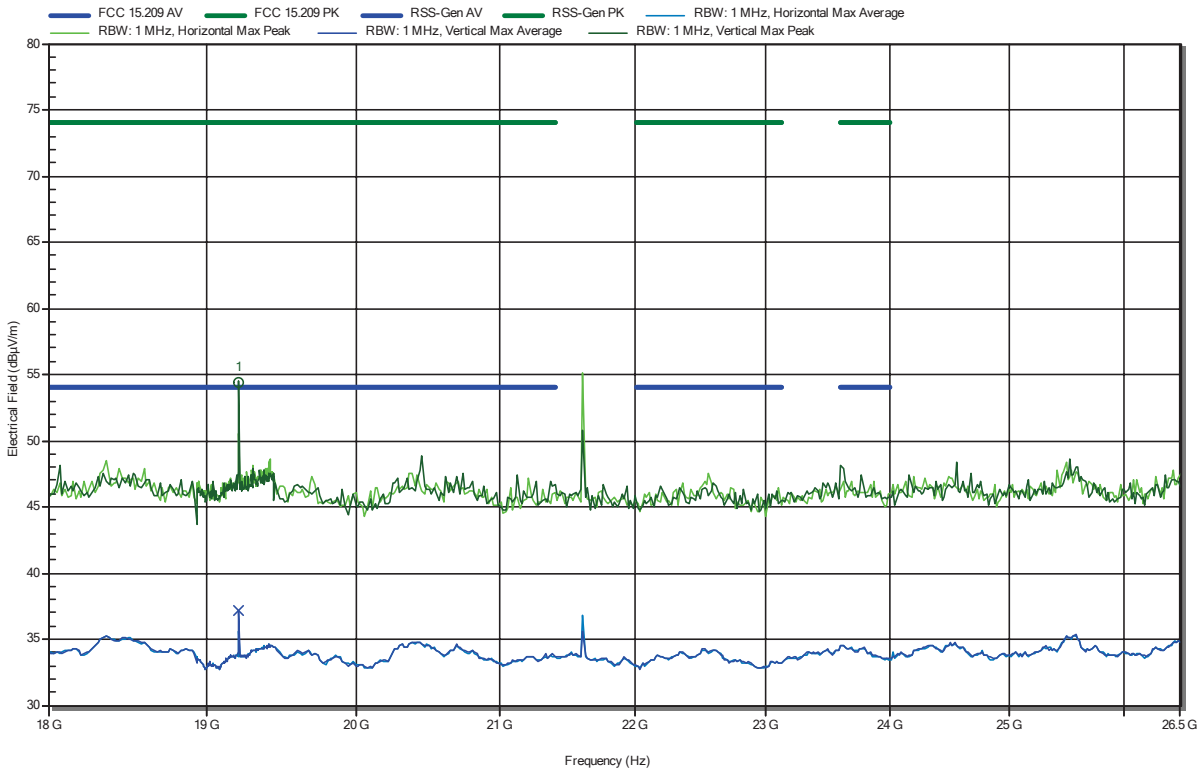
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
19.208 GHz	54.4 dBµV/m	74 dBµV/m	-19.6 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Antenna AA080004; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	

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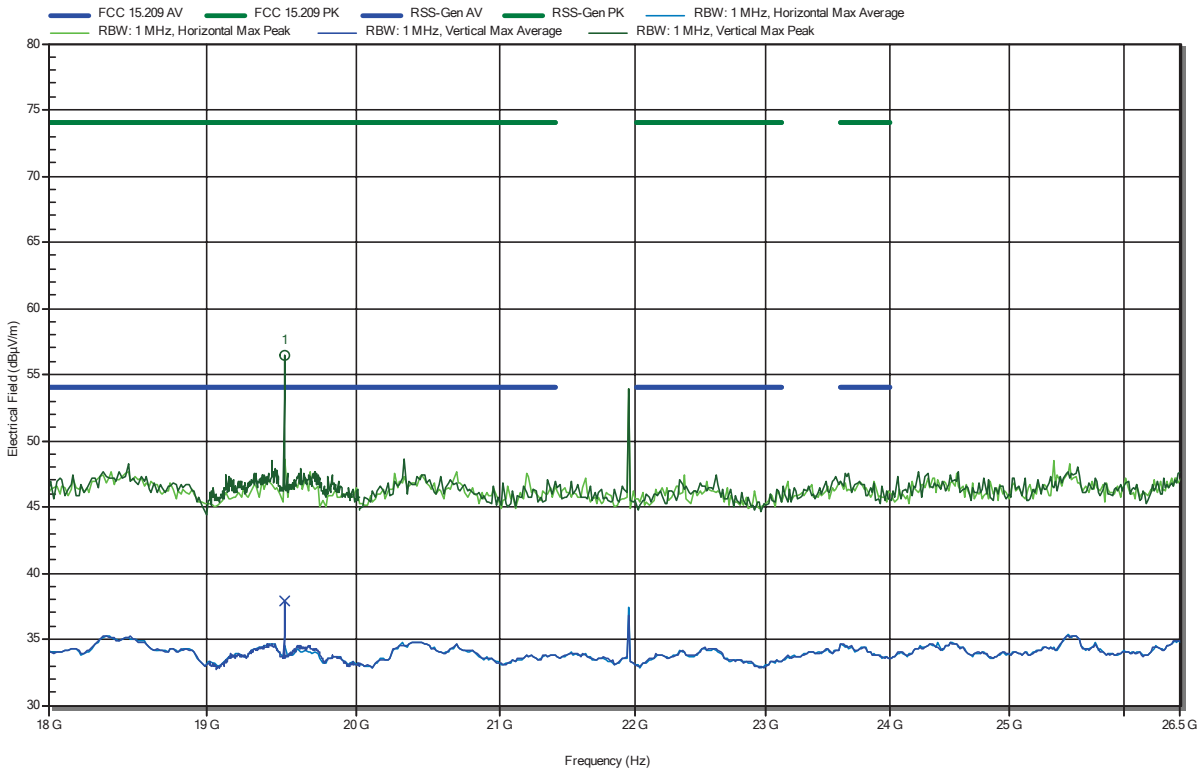
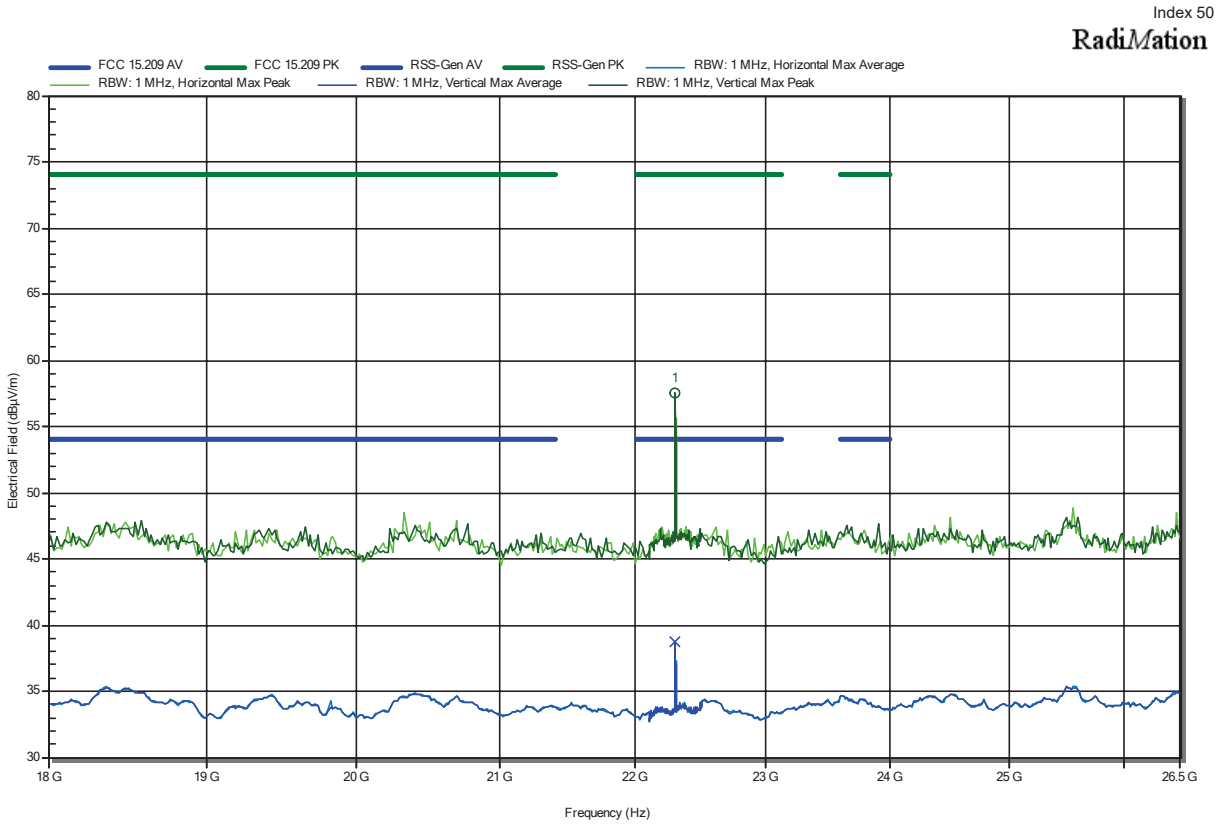
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
19.512 GHz	56.4 dBµV/m	74 dBµV/m	-17.6 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

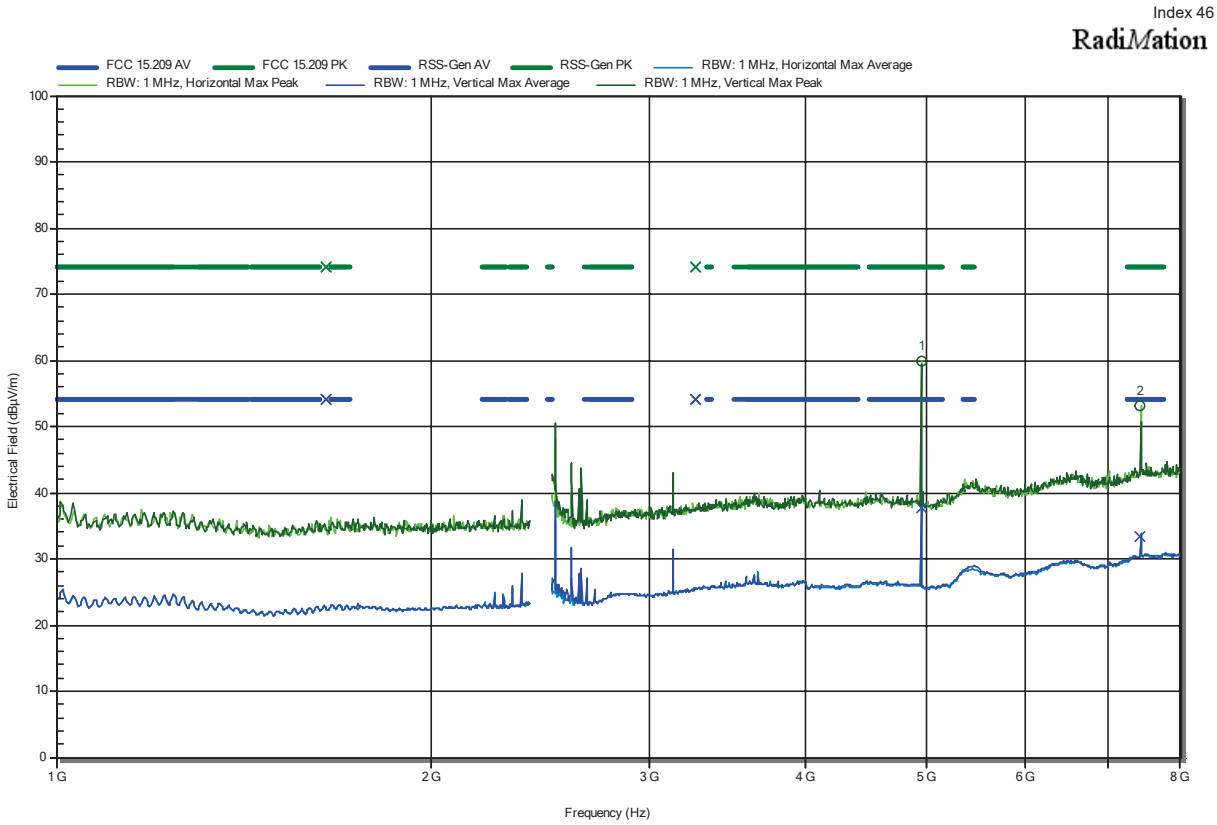
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Antenna AA080004; EUT#7.2 mode 6
Test Date:	2022-03-30
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
22.296 GHz	57.48 dBµV/m	74 dBµV/m	-16.52 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

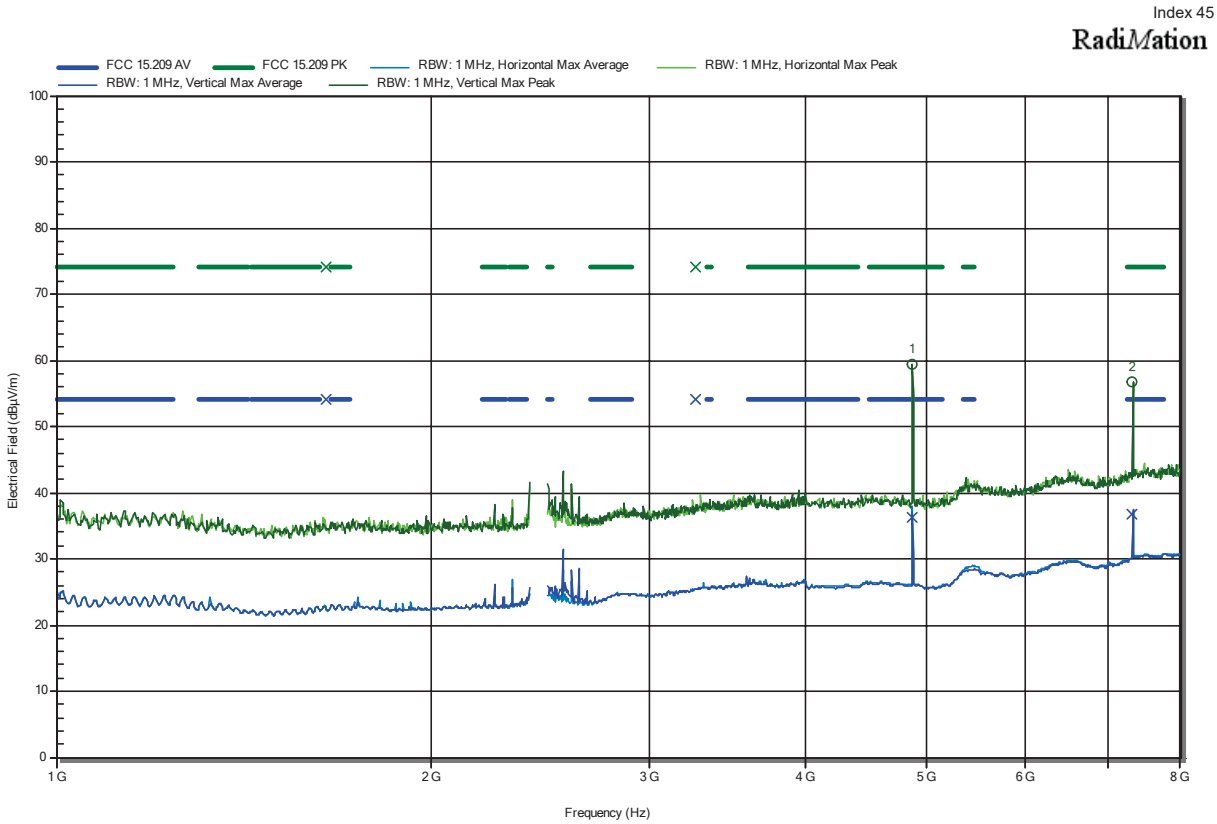
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Onboard antenna; EUT#5.2 mode 6
Test Date:	2022-03-29
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.952 GHz	59.98 dBµV/m	74 dBµV/m	-14.02 dB	Pass	Horizontal
7.432 GHz	53.11 dBµV/m	74 dBµV/m	-20.89 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

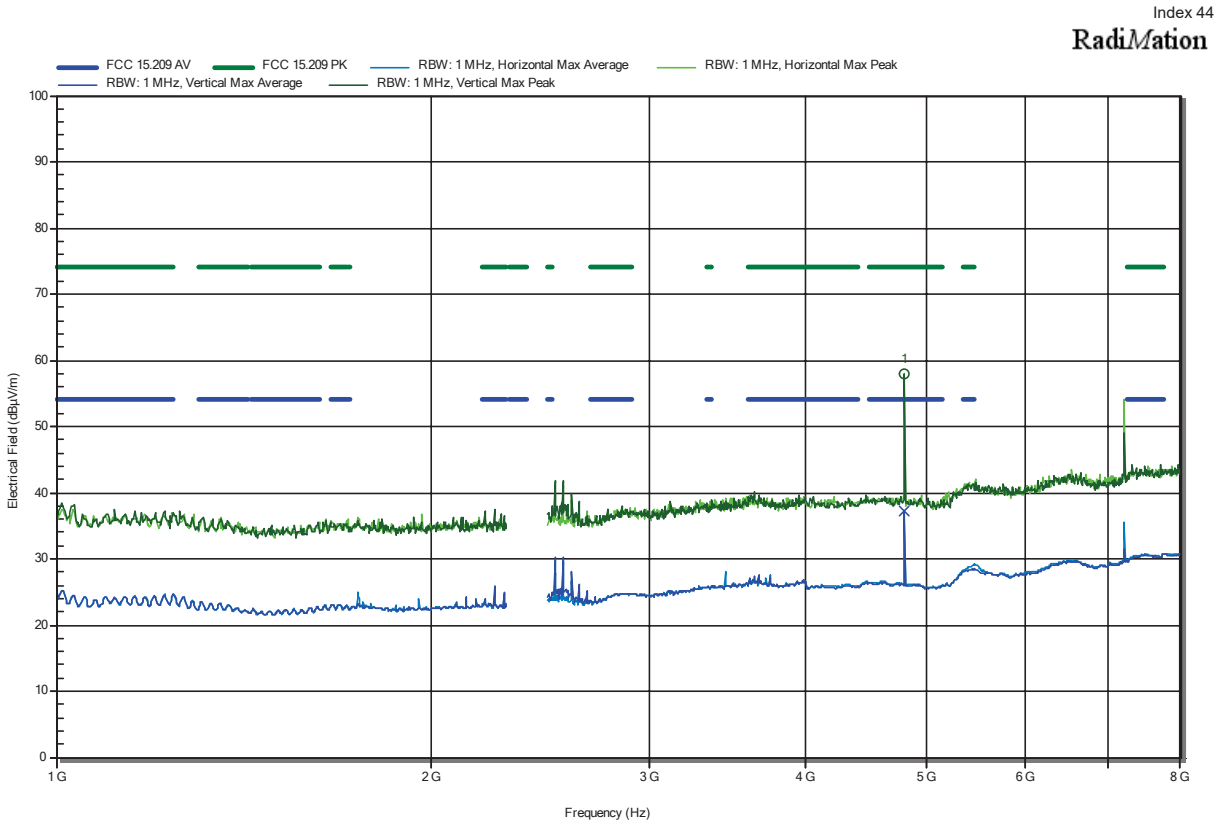
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Onboard antenna; EUT#5.2 mode 6
Test Date:	2022-03-29
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.872 GHz	59.41 dBµV/m	74 dBµV/m	-14.59 dB	Pass	Vertical
7.32 GHz	56.73 dBµV/m	74 dBµV/m	-17.27 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

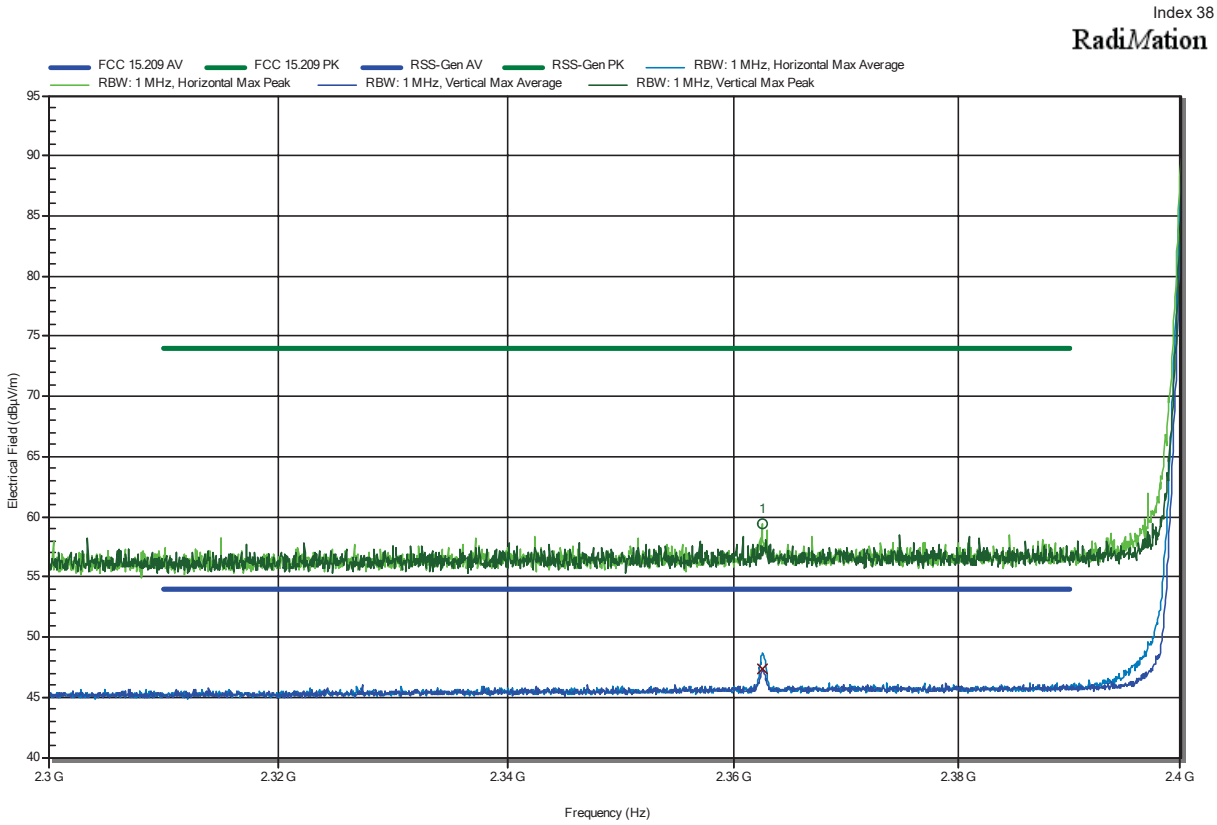
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Onboard antenna; EUT#5.2 mode 6
Test Date:	2022-03-29
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
4.8 GHz	57.84 dBµV/m	74 dBµV/m	-16.16 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Onboard antenna; EUT#5.2 mode 2
Test Date:	2022-03-28
Note:	lower bandedge



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.3626 GHz	59.41 dBµV/m	74 dBµV/m	-14.59 dB	Pass	Horizontal

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.3626 GHz	47.38 dBµV/m	54 dBµV/m	-6.62 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120B
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Onboard antenna; EUT#5.2 mode 2
Test Date:	2022-03-28
Note:	upper bandedge

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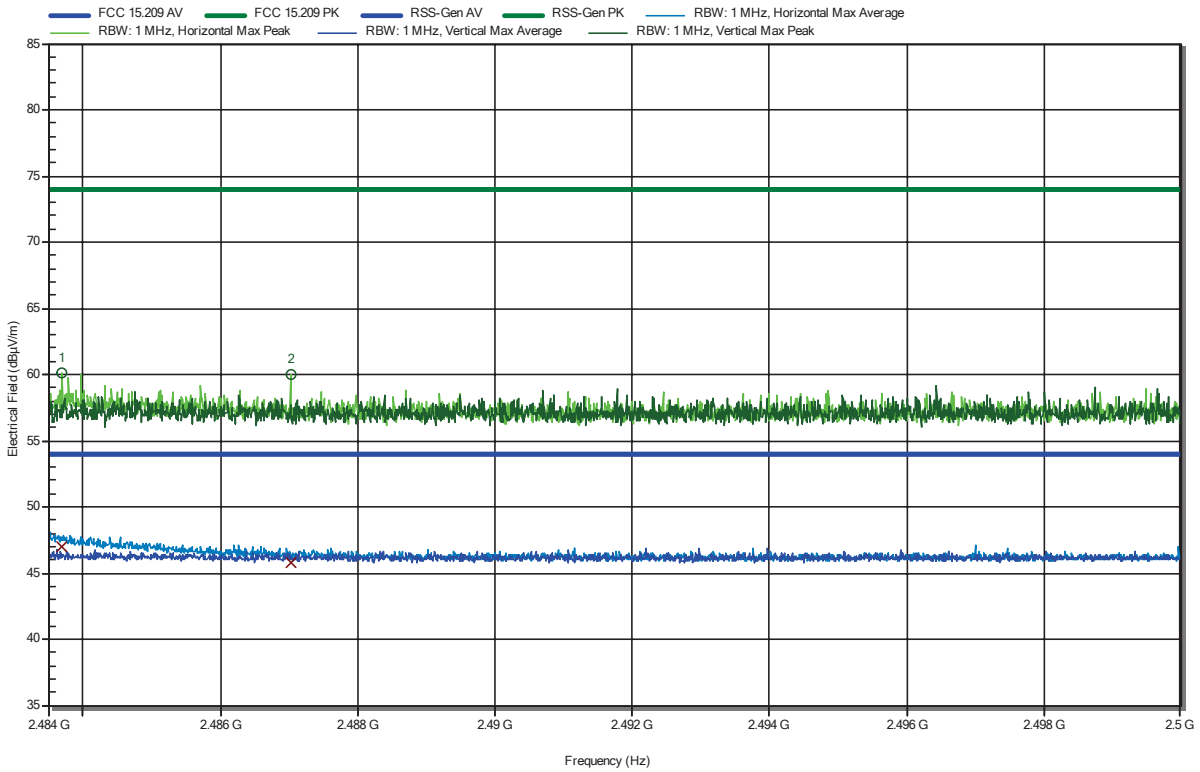
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
2.4837 GHz	60.14 dBµV/m	74 dBµV/m	-13.86 dB	Pass	Horizontal
2.487 GHz	60 dBµV/m	74 dBµV/m	-14 dB	Pass	Horizontal

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
2.4837 GHz	46.97 dBµV/m	54 dBµV/m	-7.03 dB	Pass	Horizontal
2.487 GHz	45.75 dBµV/m	54 dBµV/m	-8.25 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Onboard antenna; EUT#5.2 mode 6
Test Date:	2022-03-30
Note:	

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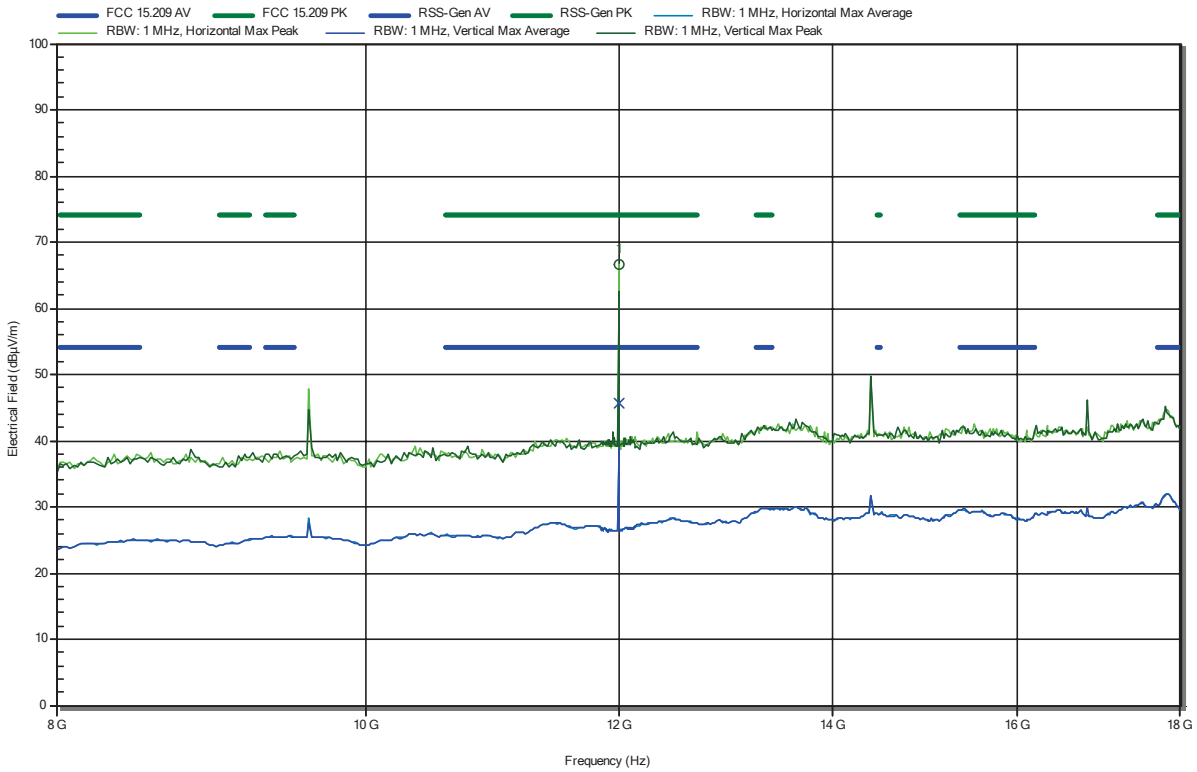
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
12.005 GHz	56.71 dBµV/m	74 dBµV/m	-17.29 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2401.0 MHz; Onboard antenna; EUT#5.2 mode 6
Test Date:	2022-03-31
Note:	

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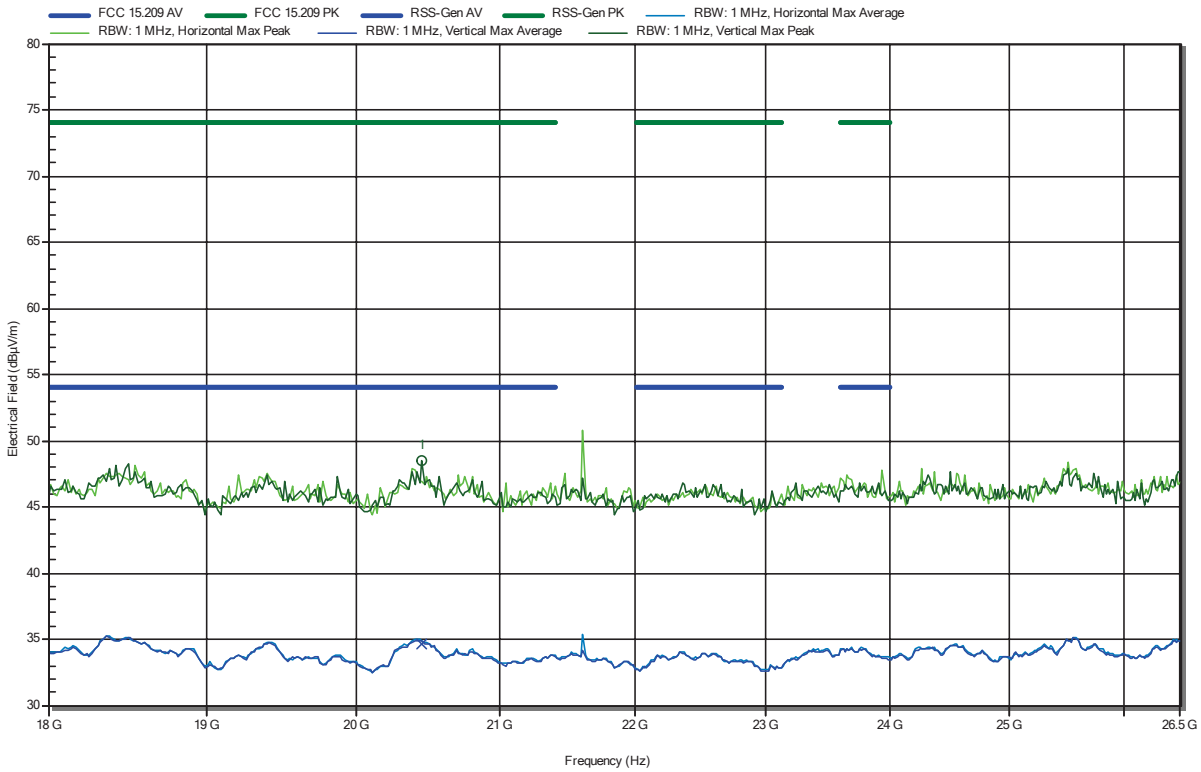
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
20.448 GHz	48.55 dBµV/m	74 dBµV/m	-25.45 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2438.92 MHz; Onboard antenna; EUT#5.2 mode 6
Test Date:	2022-03-30
Note:	

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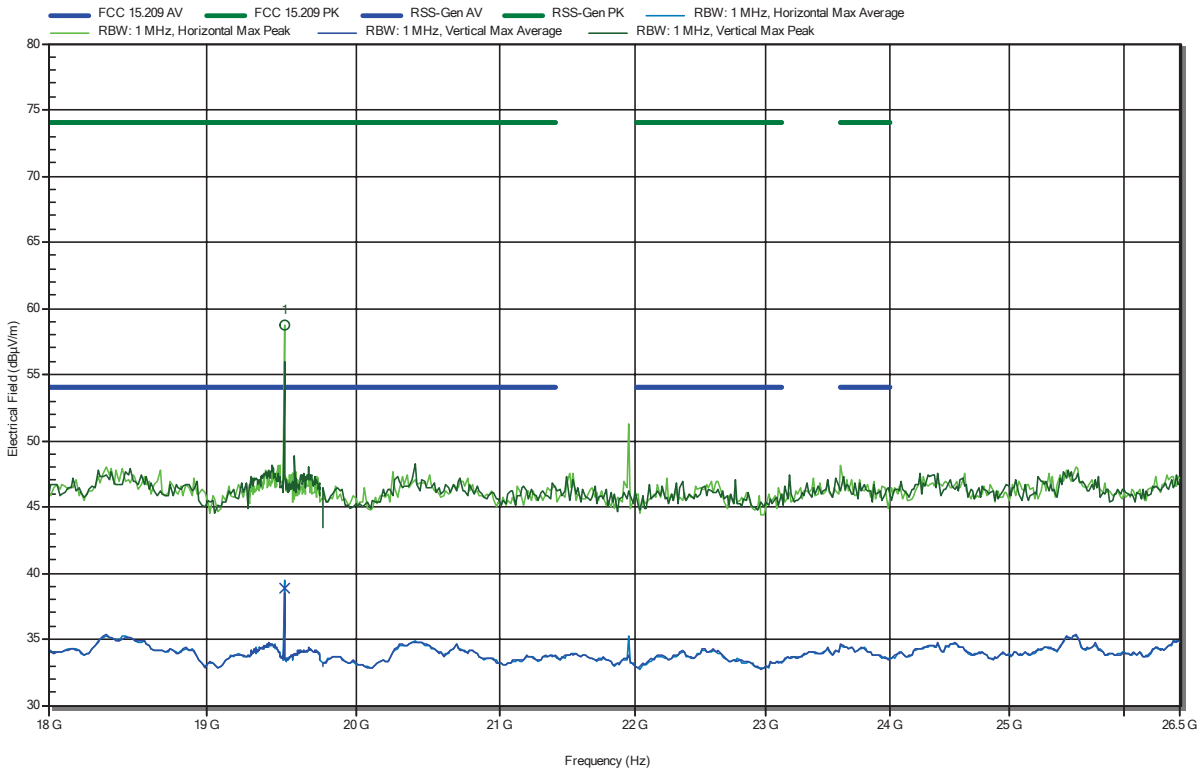
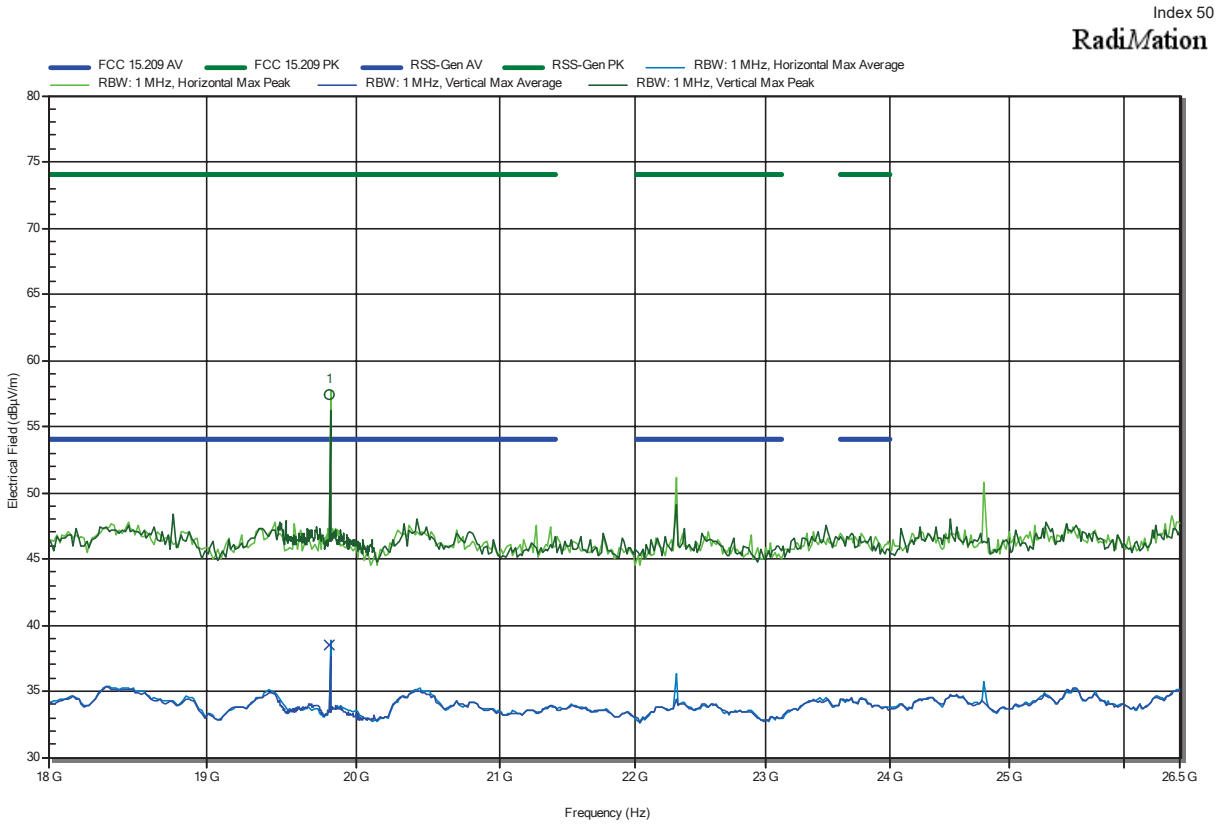
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
19.511 GHz	58.74 dBµV/m	74 dBµV/m	-15.26 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC 15.247

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 23 °Celsius, Vnom: 3.7 VDC
Antenna:	Amplifier Research AT4560
Measurement distance:	3 m
Mode:	Tx; GFSK; 2477.32 MHz; Onboard antenna; EUT#5.2 mode 6
Test Date:	2022-03-30
Note:	

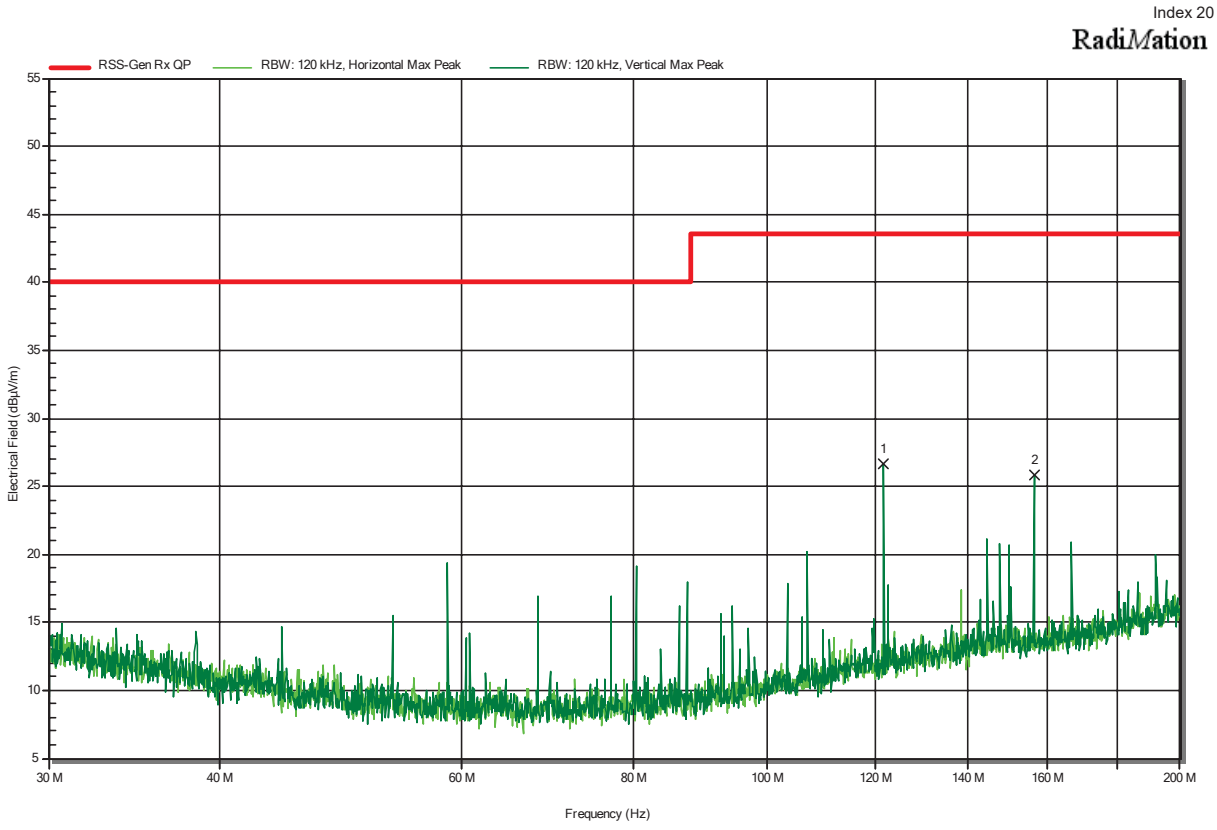


Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
19.819 GHz	57.46 dBµV/m	74 dBµV/m	-16.54 dB	Pass	Horizontal

ANNEX B Receiver spurious emissions

Radiated Spurious Emissions according to RSS-247 Issue 2

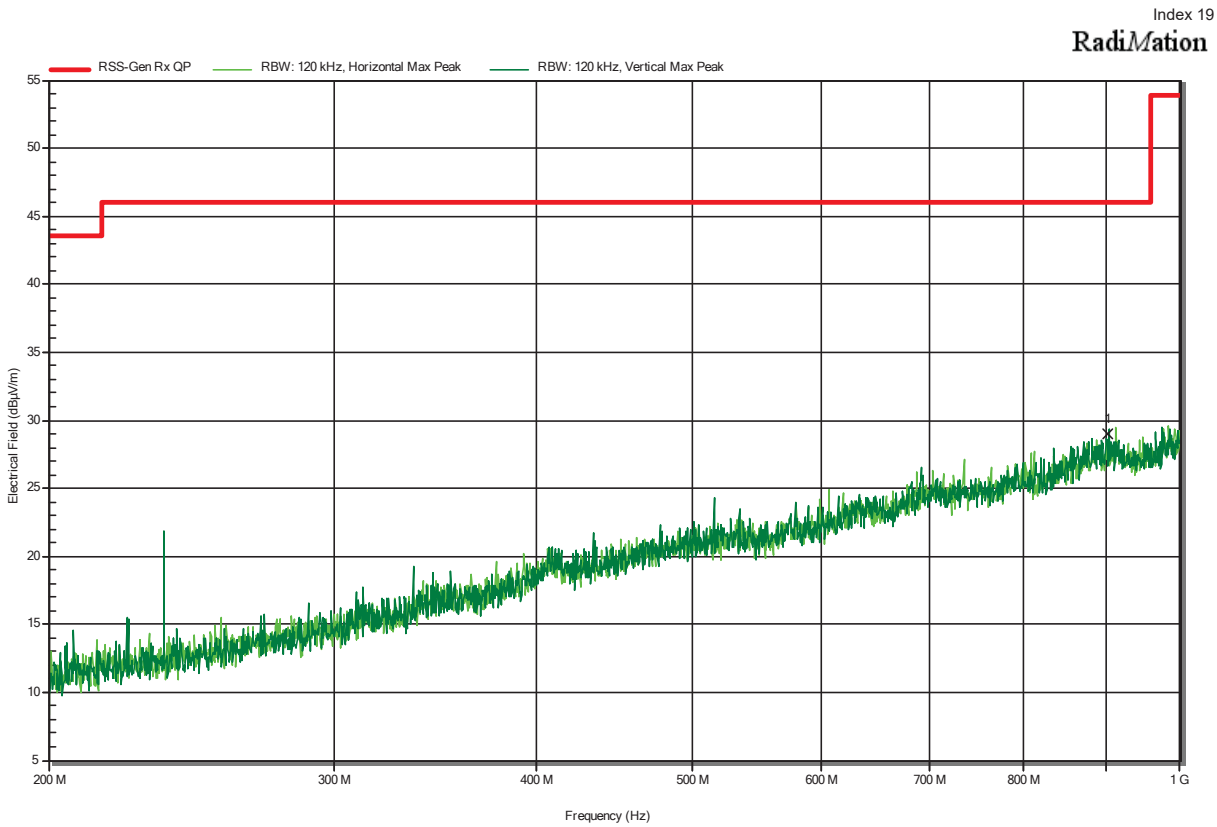
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HK 116
Measurement distance:	3 m
Mode:	Rx; GFSK; 2438.92 MHz; Dipol coaxial antenna AA050031; EUT#7.2 mode 3
Test Date:	2022-03-30
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
121.5917 MHz	26.7 dBµV/m	43.5 dBµV/m	-16.83 dB	Pass	Vertical
156.4843 MHz	25.8 dBµV/m	43.5 dBµV/m	-17.71 dB	Pass	Vertical

Radiated Spurious Emissions according to RSS-247 Issue 2

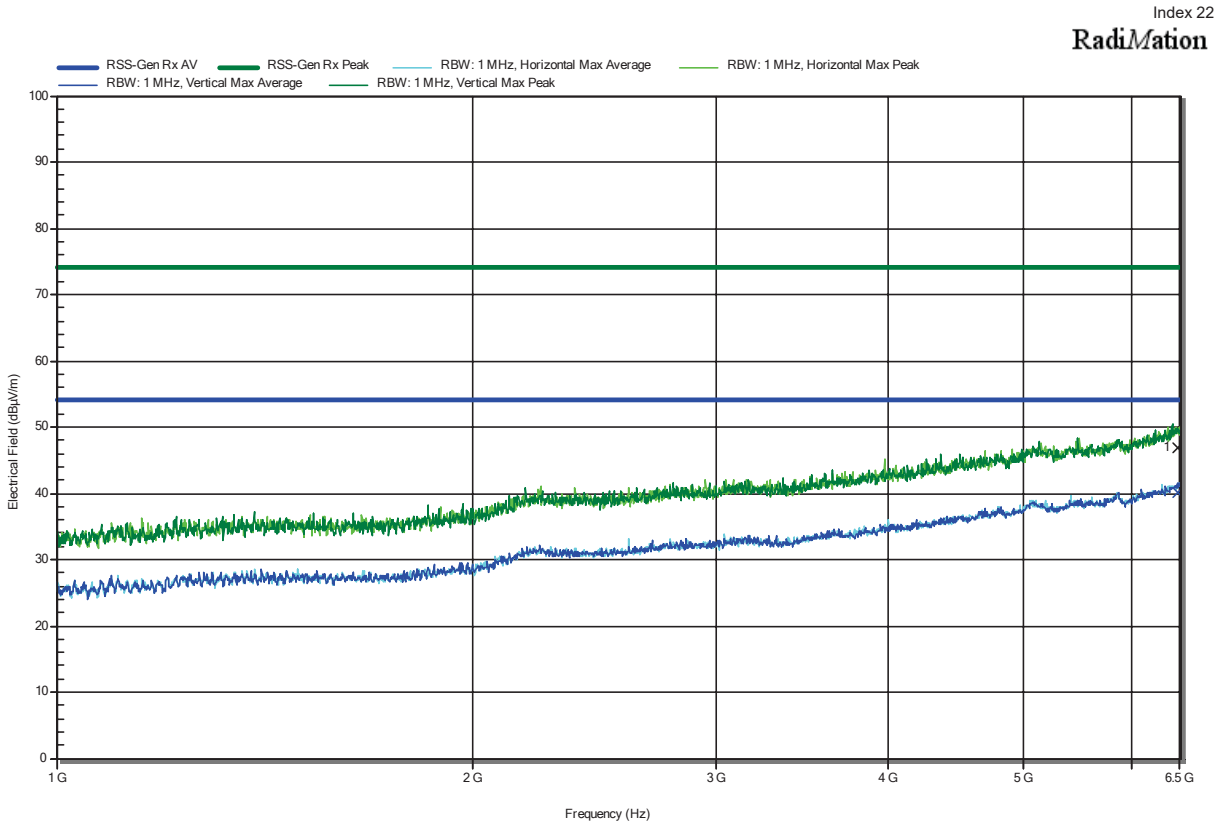
Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Rohde & Schwarz HL 223
Measurement distance:	3 m
Mode:	Rx; GFSK; 2438.92 MHz; Dipol coaxial antenna AA050031; EUT#7.2 mode 3
Test Date:	2022-03-30
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
903.14 MHz	29 dBµV/m	46 dBµV/m	-17.03 dB	Pass	Vertical

Radiated Spurious Emissions according to RSS-247 Issue 2

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck BBHA 9120D
Measurement distance:	3 m
Mode:	Rx; GFSK; 2438.92 MHz; Dipol coaxial antenna AA050031; EUT#7.2 mode 3
Test Date:	2022-03-30
Note:	

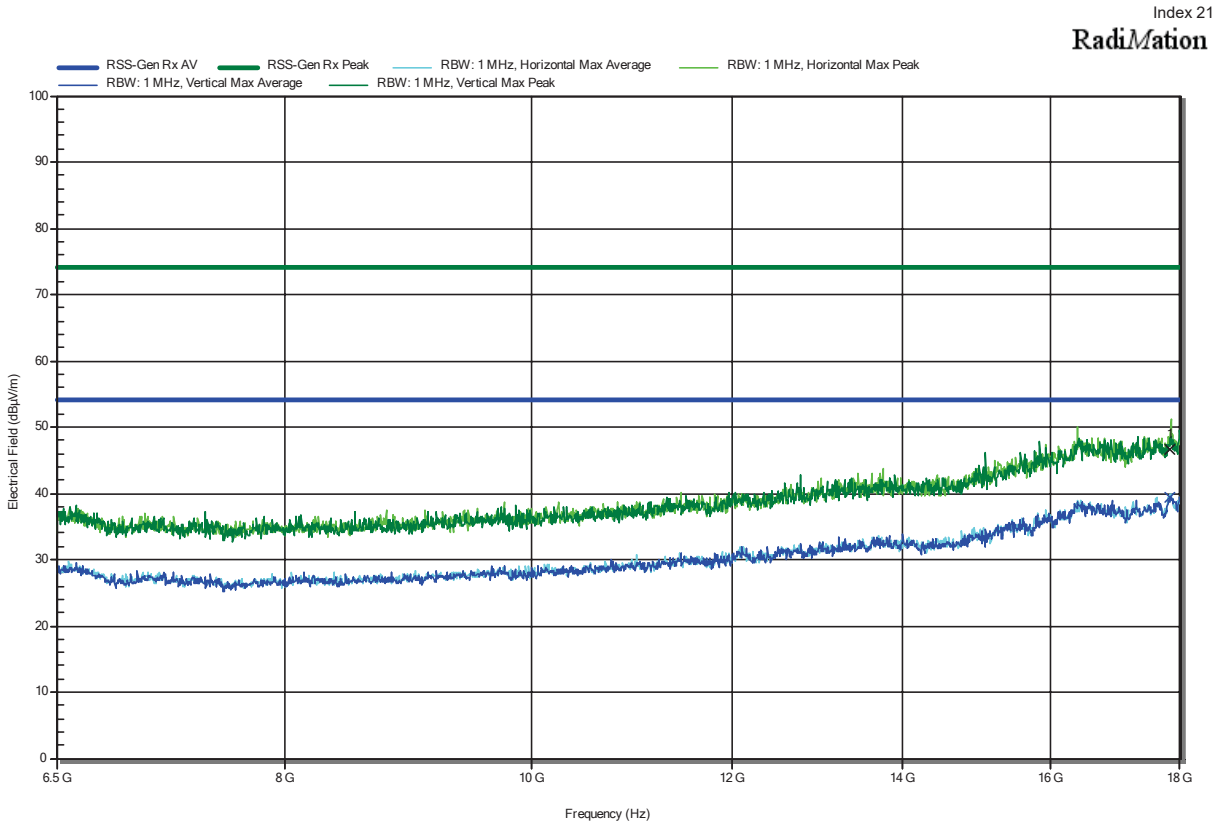


Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
6.483 GHz	46.87 dBµV/m	74 dBµV/m	-27.13 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
6.483 GHz	40 dBµV/m	53.98 dBµV/m	-13.98 dB	Pass	Vertical

Radiated Spurious Emissions according to RSS-247 Issue 2

Project Number:	G0M-2111-1168
Applicant:	HBC-radiomatic GmbH
Model Description:	Radio module for industrial application
Model:	TC242
Test Sample ID:	39316
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Qawasmeh
Measurement software:	RadiMation, version 2020.1.8
Test Conditions:	Tnom: 20 °Celsius, Vnom: 3.7 VDC
Antenna:	Schwarzbeck HWRD 650
Measurement distance:	3 m
Mode:	Rx; GFSK; 2438.92 MHz; Dipol coaxial antenna AA050031; EUT#7.2 mode 3
Test Date:	2022-03-30
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
17.844 GHz	46.61 dBµV/m	74 dBµV/m	-27.39 dB	Pass	Vertical

Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
17.844 GHz	39.33 dBµV/m	53.98 dBµV/m	-14.65 dB	Pass	Vertical

= = = END OF TEST REPORT = = =